

OIL AND GAS IN POLAND



23 TENDER BLOCKS

LICENSING ROUNDS
INFORMATION AND
OPPORTUNITIES
2017-2018



MINISTRY
OF THE ENVIRONMENT



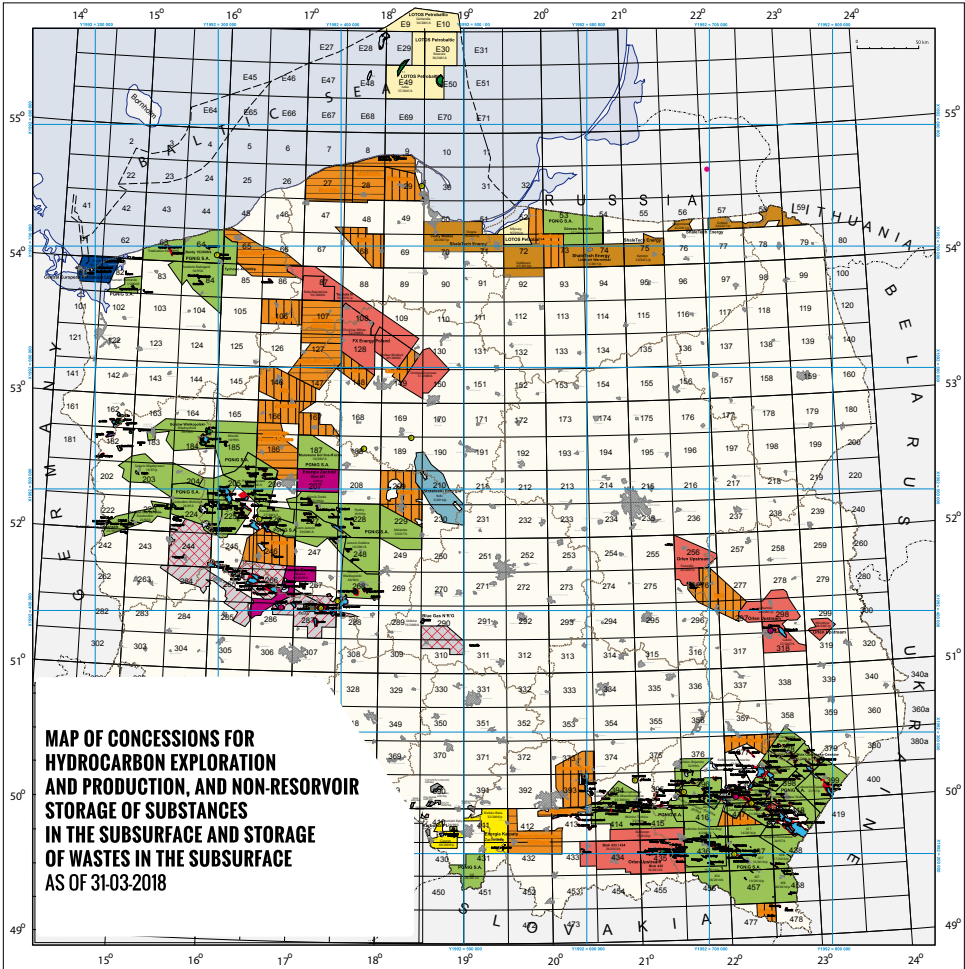
Polish Geological Institute
National Research Institute



POLAND

23 TENDER BLOCKS

Licensing rounds:
information and opportunities 2017-2018



Elaboration : R. Bořda, D. Słodka, M. Szuflicki © Copyright by PGI (2018)
WARSAWA - as of 31-03-2018

Prospecting and exploration and production concessions:

- | | | |
|------------------------------|--|--|
| PGNiG S.A. | Hutton Energy PLC | Concessions of prospecting and production of coal bed methane |
| Grupa LOTOS Petrobaltic S.A. | PKN Orlen S.A. | Pending applications |
| TRIAS Sp. z o.o. | Stena Investment S.A.R.L. | Pending applications submitted according to the article 46 of the Act on Geological and Mining Law |
| Blue Gas N'R'G Sp. z o.o. | Palomar Capital Advisords Limited - San Leon Energy B.V. | Pending applications submitted according to the article 47 of the Act on Geological and Mining Law |
| San Leon Energy Plc | Central European Petroleum Ltd | |
| | | Areas typified to the tender - Round 2 |
| | | Areas typified to the tender - Round 3 |

PREFACE

On the 29th of June 2016 and 28th of June 2017, the Polish Ministry of the Environment announced two rounds (round 2 and round 3, respectively) of planned concessions bidding for offered blocks dedicated to prospection, exploration and exploitation of hydrocarbons. All areas have been selected and based on their promising perspectives for oil and gas field discoveries, both conventional and unconventional.

In order to assist stakeholders and members of the public with information, the Ministry presents this folder describing the short overview of all areas offered for bidding, hoping that it will help to learn geological and geographical conditions of assumed hydrocarbon deposits occurrence.

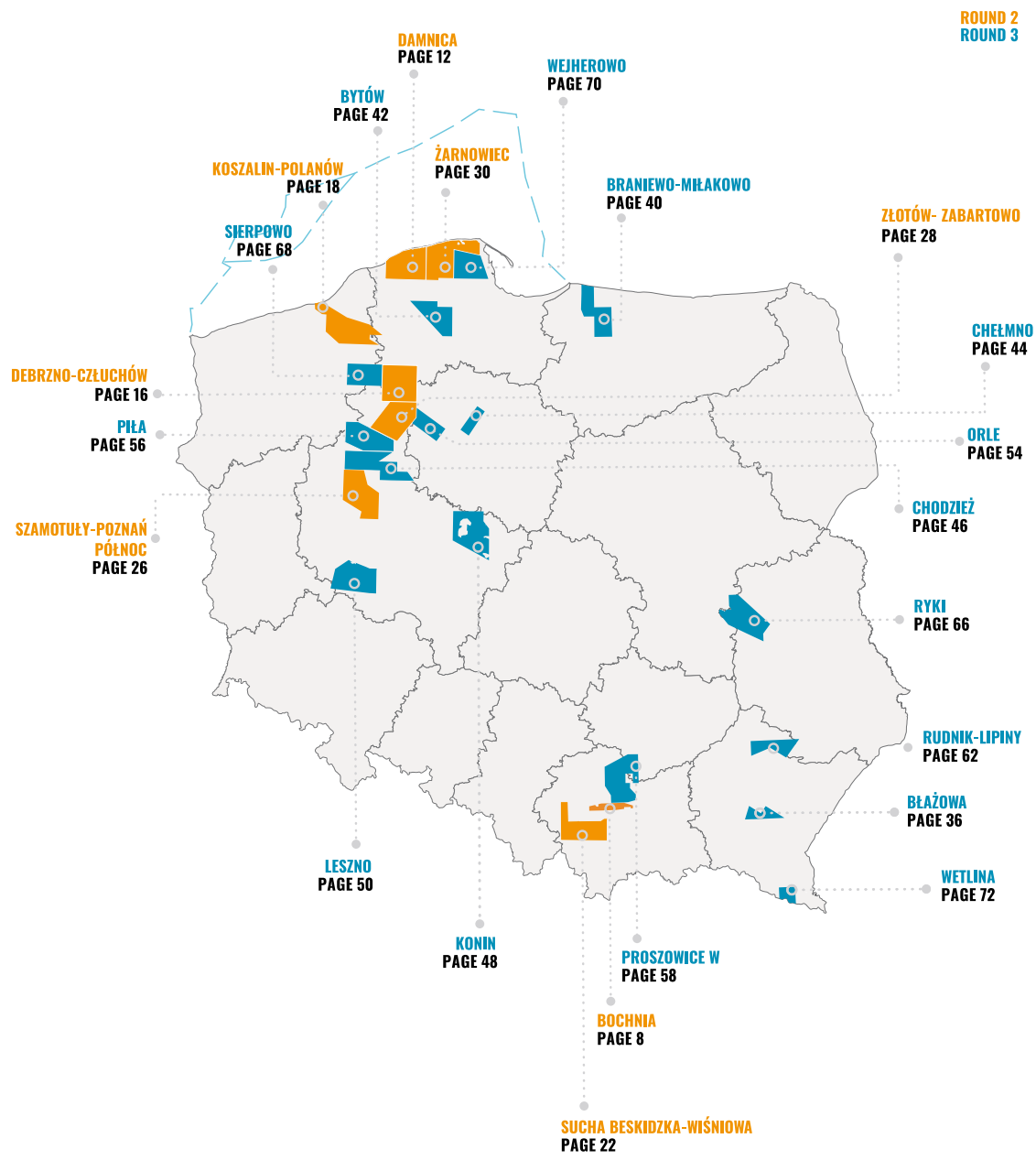
Each tender area has its dedicated section with detailed description accompanied by the map of a respective area borders, its geographical coordinates, seismic cross sections and deep boreholes locations. The maps have been edited by the Polish Geological Institute – National Research Institute (PGI-NRI).

We believe that this publication will contribute to better understanding of the offered tender areas and encourage investments in the Polish oil and gas sector.

23 TENDER BLOCKS

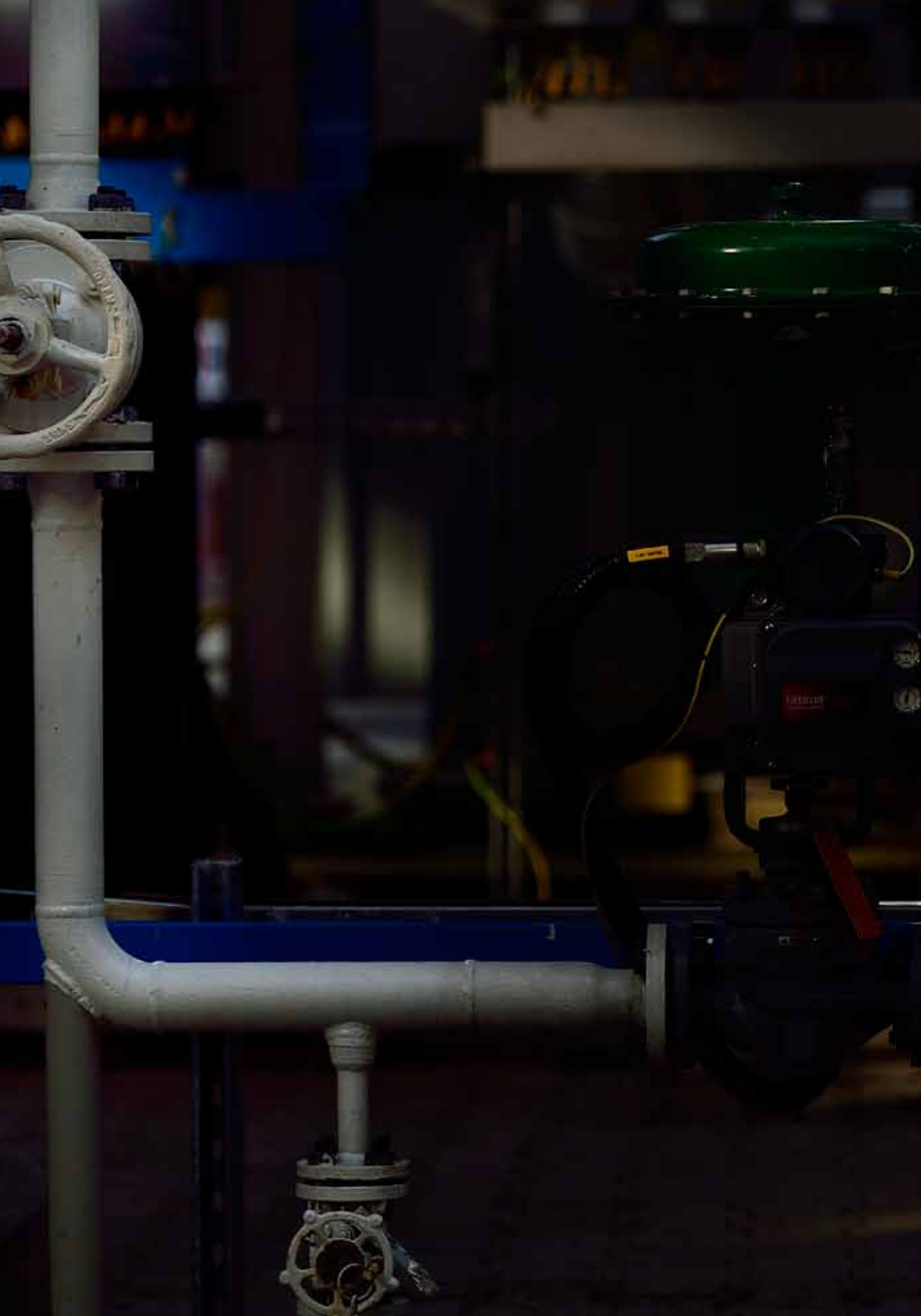
Licensing rounds:
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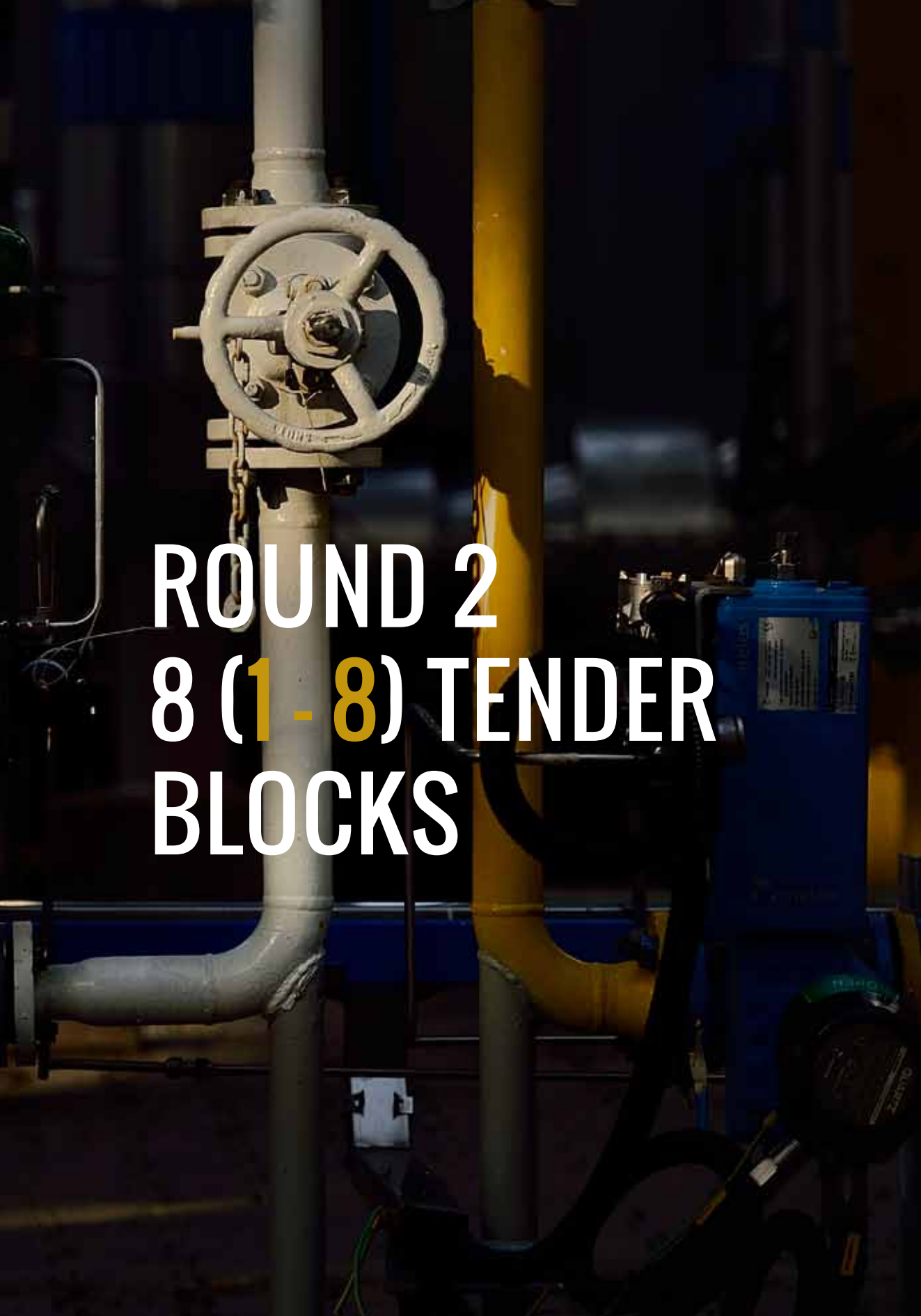
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No.	Block name	Licensing rounds time frame	Exploration target
1	Bochnia	May 2018	Conventional: Carpathians, Carpathian Foredeep, Palaeozoic-Mesozoic basement
2	Damnica	May 2018	Conventional: Middle Cambrian; Unconventional: shale oil and gas in Lower Palaeozoic
3	Debrzno-Człuchów	May 2018	Conventional: Devonian, Carboniferous and Permian (Rotliegend and Zechstein/Main Dolomite); Unconventional: tight gas in Permian (Rotliegend)
4	Koszalin-Polanów	May 2018	Conventional: Devonian, Carboniferous and Permian (Rotliegend and Zechstein/Main Dolomite)
5	Sucha Beskidzka-Wiśniowa	May 2018	Conventional: Carpathians, Carpathian Foredeep, Palaeozoic-Mesozoic basement
6	Szamotuły-Poznań Północ	May 2018	Conventional: Carboniferous and Permian (Rotliegend and Zechstein/Main Dolomite); Unconventional: tight gas in Carboniferous and Permian (Rotliegend)
7	Złotów-Zabartowo	May 2018	Conventional: Permian (Rotliegend and Zechstein/Main Dolomite); Unconventional: tight gas in Permian (Rotliegend)
8	Żarnowiec	May 2018	Conventional: Middle Cambrian and Permian (Zechstein/Main Dolomite); Unconventional: shale oil and gas in Lower Palaeozoic

No.	Block name	Licensing round time frame	Exploration target
9	Błażowa	in preparation	Conventional: Carpathians, Carpathian Foredeep, Palaeozoic-Mesozoic basement
10	Braniewo-Miłakowo	in preparation	Conventional: Middle Cambrian; Unconventional: shale oil and tight oil in Lower Palaeozoic
11	Bytów	in preparation	Conventional: Lower and Middle Cambrian; Unconventional: shale gas in Lower Palaeozoic
12	Chełmno	in preparation	Conventional: Devonian, Carboniferous and Permian (Rotliegend and Zechstein/Main Dolomite)
13	Chodzież	in preparation	Conventional: Permian (Rotliegend); Unconventional: tight gas in Permian (Rotliegend)
14	Konin	in preparation	Conventional: Jurassic and Lower Cretaceous
15	Leszno	in preparation	Conventional: Carboniferous and Permian (Rotliegend and Zechstein/Main Dolomite)
16	Orle	in preparation	Conventional: Carboniferous and Permian (Rotliegend and Zechstein/Main Dolomite)
17	Piła	in preparation	Conventional: Permian (Rotliegend); Unconventional: tight gas in Permian (Rotliegend)
18	Proszowice W	in preparation	Conventional: Upper Jurassic and Lower Cretaceous
19	Rudnik-Lipiny	in preparation	Conventional: Carpathian Foredeep
20	Ryki	in preparation	Conventional: Upper Devonian and Carboniferous; Unconventional: tight gas in Upper Devonian
21	Sierpowo	in preparation	Conventional: Devonian, Carboniferous and Permian (Rotliegend and Zechstein/Main Dolomite)
22	Wejherowo	in preparation	Conventional: Middle Cambrian; Unconventional: shale oil, shale gas and tight gas in Lower Palaeozoic
23	Wetlina	in preparation	Conventional: Carpathians



The background of the image shows an industrial setting with various pipes and valves. A prominent white vertical pipe runs through the center, featuring a large, light-colored handwheel valve. To the right, a yellow vertical pipe is visible. In the lower right, there is a blue piece of industrial equipment with some text and labels. The overall lighting is dim, with some highlights on the pipes and the handwheel.

ROUND 2 8 (1 - 8) TENDER BLOCKS

01 TENDER BLOCK BOCHNIA

Licensing rounds:
information and opportunities 2017-2018

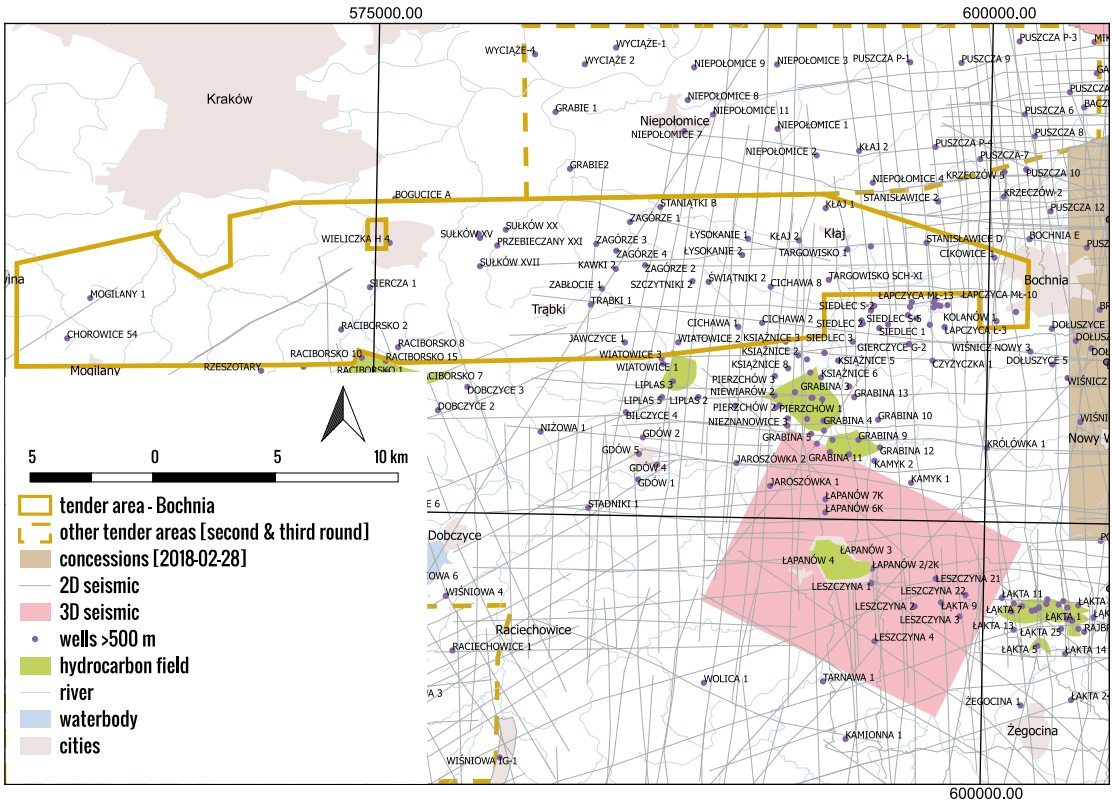


ACREAGE: 218.9 km²
54,092 ACRES

The hydrocarbon potential of the “Bochnia” tender area is confirmed by numerous hydrocarbon deposits discovered in the Miocene molasse of the Carpathian Foredeep and in the Jurassic and Cretaceous basement in the neighborhood blocks. At least two conventional working petroleum systems occur at the block. The first one is related to the biogenic gases generated and accumulated continuously during the sedimentation of fine- and coarse-grained clastic deposits in the Carpathian Foredeep, favoring the formation of multi-horizontal stratigraphic traps. The second petroleum system occurs below, at depths between 500 and 4,500 m.

Apart from the Jurassic and Cretaceous strata, high porosity was observed also in the Cambrian and Lower Devonian sandstones and in the Middle and Upper Devonian carbonates, while only the Middle Jurassic claystones are supposed to be the effective source rocks in the local geologic profile. The migration of gases from the neighboring blocks should also be considered in this case.

Thirty-one deep boreholes reached the perspective horizons in the “Bochnia” tender area. The 2D seismic investigations include 54 lines of total length about 744 km. No 3D seismic surveys have been performed, so far.



01 TENDER BLOCK BOCHNIA

Licensing rounds:
information and opportunities 2017-2018

Location: onshore, part of Ministry of the Environment concession blocks: 393, 412, 413; in block of the following counties and communes: Małopolskie province: Kraków county, communes: Skawina (participation in the concession block 1.7%), Mogilany (11.50%), Świątniki Górne (4.85%), Kraków city county: commune: Kraków (6.13%); Wieliczka county, communes: Wieliczka (23.53%), Niepotomice (5.57%), Kłaj (13.88%), Biskupice (15.53%), Gdów (9.36%); Bochnia county: commune: Bochnia (5.53%), Bochnia (city) (2.41%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposit

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years), extracting phase – after the investment decision

Type of deposit: Conventional for gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Palaeozoic–Mesozoic of the Carpathian basement
II – flysch of the Carpathian nappes
III – Carpathian Foredeep

Reservoir rock:

I – Cambrian sandstones, Lower Devonian limestones and dolomites, Upper Devonian limestones and dolomites, Upper Jurassic limestones, Cenomanian Sandstones
II – flysch of the Silesian Unit: Grodziszczę Beds, Wierzowice Beds, Lgota Beds, sandstones of Ciężkowice, Menilite and Krosno beds; flysch of the Sub-Silesian Unit: Wierzowice and Lgota beds,
III – clastic rocks of the autochthonous Miocene (sand and sandstones of the Upper Badenian and Lower Sarmatian)

Thickness of overburden:

I – 500–1,000 m
II – 0–100 m
III – 100–500 m

Completed seismic surveys (owner):

1976: 2 lines Brzesko-Pilzno-Olszyny 2D (State Treasury)
1977: 1 line Bochnia-Czchów-Tarnów 2D (State Treasury)
1978: 2 lines Górnśląskie Zagłębę Węglowe 2D (State Treasury)
1978: 3 lines Żywiec-Wadowice-Gdów 2D (State Treasury)
1992: 5 lines Dobczyce-Gdów-Wolica 2D (PGNiG S.A.)
1993: 9 lines Liplas-Grobla-Żukowice 2D (PGNiG S.A.)
1993: 5 lines Liplas-Puszcza, (Liplas-Grobla-Żukowice)

1994: 1 line Lachowice-Myślenice 2D (PGNiG S.A.)
2003: 5 lines Puszcza-Krzeczów-Borek 2D (PGNiG S.A.)
2004: 9 lines Kamyk-Niepotomice 2D (PGNiG S.A.)
1987-1989: 12 lines Niepotomice-Gdów-Myślenice 2D (State Treasury)

Structural stage:

Carpathian Orogenic Belt
Palaeozoic and Mesozoic of the West European Platform

Source rock:

I – Lower Carboniferous clastic and carbonate rocks, Upper Carboniferous clastic rocks, Middle Jurassic mudstones and claystones
II – Lower Cretaceous Cieszyn Beds, Wierzowice Beds, Grodziszczę Beds, Lgota Beds, Oligocene Menilite shales of all nappe units
III – Carpathian Foredeep fine-grained rocks

Seal rock:

I – evaporites and fine-grained deposits of the autochthonous Miocene of the Carpathian Foredeep
II – fine-grained flysch deposits
III – fine-grained flysch deposits and fine-grained deposits of the autochthonous Miocene of the Carpathian Foredeep

Trap type:

I – structural, stratigraphic
II – structural, structural-lithological, lithological
III – structural, compactional anticlines

Key wells (MD):

Cichawa 8 (1,029.0 m), Cikowice 1 (1,465.5 m), Trąbki 1 (862.0 m), Mogilany 1 (2,500.0 m)



The proposed minimum work program of prospecting and exploration phase:

Stage I (12 months) – reprocessing and reinterpretation of archival seismic 2D data

Stage II (12 months) – acquisition 50 km² of new 3D seismic survey or 50 km of 2D survey

Stage III (24 months) – drilling of one exploration well to the minimum depth of 1,100 m (TVD) and maximum depth of 4,500 m with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters

Stage IV (12 months) – analysis of obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Grabina-Nieznanowice (G) – documented in 1971; cumulative production to 2015 – 161.25 million m³; production in 2015 – 1.96 million m³; balance resources in 2015 – 173.30 million m³; industrial resources in 2015 – 12.96 million m³

Grabina-Nieznanowice S (G) – documented in 1987; cumulative production to 2015 – 17.25 million m³; balance resources in 2015 – 205.74 million m³; production in 2015 – 0.1 million m³; industrial resources in 2015 – 110.54 million m³

Grądy Bocheńskie (G) – documented in 1985; cumulative production to 2015 – 166.87 million m³; production in 2015 – none; balance resources – none; industrial resources in 2015 – none

Łapanów (G) – documented in 2008; cumulative production to 2015 – 18.04 million m³; production in 2015 – 17.92 million m³; balance resources in 2012 – 306.18 mln m³; industrial resources in 2015 – 307.28 million m³

Łąka (G, O) – documented in 1971; cumulative production of natural gas to 2015 – 96.15 million m³; cumulative production of gas from condensate in 2015 – 721.38 million m³; production of gas from condensate in 2015 – none; production of natural gas in 2015 – 3.02 million m³; crude oil – none; balance resource of natural gas in 2015 – 211.72 million m³; balance resource of condensate in 2015 – 4.58 ktonnes; industrial resources of natural gas in 2015 – 14.93 million m³

Raciborsko (G) – documented in 1971; cumulative production to 2015 – 25.75 million m³; production in 2015 – 0.22 million m³; balance resources in 2015 – 431.65 million m³; industrial resources in 2015 – 16.31 million m³

Słopnice (G) – documented in 1973; cumulative production to 2015 – 42.02 million m³; production in 2015 – none; balance resources – none; industrial resources – none



01 TENDER BLOCK BOCHNIA

THE TENDER PROCEDURE

The granting of a concession for the prospecting and exploration of a hydrocarbon deposit and the production of hydrocarbons from a deposit, or a concession for the production of hydrocarbons from a deposit requires a tender procedure.

The tender procedure provides non-discriminatory access to the execution of activities related to the prospecting, exploration or production of hydrocarbons and is consistent with the Hydrocarbons Directive.

2017-2018 LICENSING ROUND TIMETABLE

June 29th, 2016 June 28th, 2017	announcement Licensing of the tender blocks of respectively round 2 and round 3
MAY 2018 2018 PLANNED - DATE NOT YET DEFINED	a call for tender blocks for round 2 a call for tender blocks for round 3
till 7 days after a call for tender	deadline to submit an application for clarifications regarding the tender conditions
min. 90 days after a call for tender	timeframe for offer submission for entities with positive result of the qualification procedure

Priority will be given to the best systems of hydrocarbon deposits exploration and extraction or hydrocarbon production. The offers evaluation will be based on the following criteria:

experience in performing activities of prospecting and exploration of hydrocarbon deposits or production of hydrocarbons from deposits,

technical ability to perform abovementioned activities,
financial capabilities of the bidder ,
technology of conducting geological work,
the scope and timing of the proposed geological work,
the scope and timing of mandatory geological sampling.

02 TENDER BLOCK DAMNICA

Licensing rounds:
information and opportunities 2017-2018



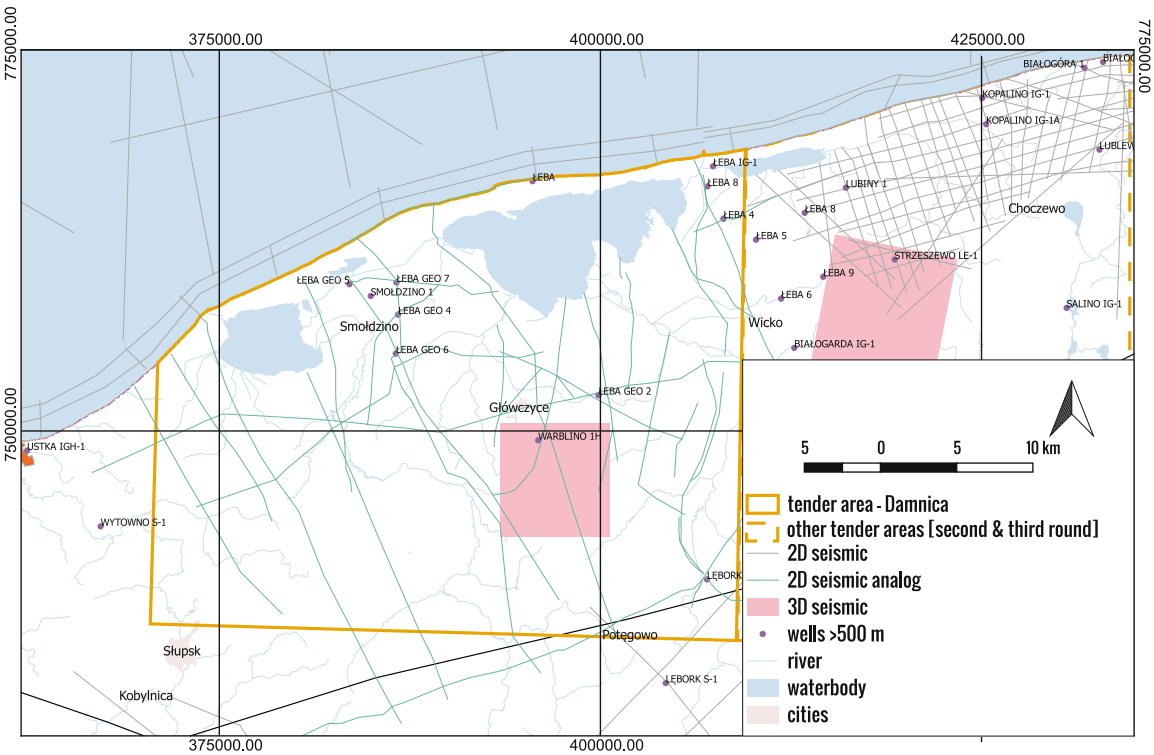
ACREAGE: 1,039.29 km²
256,814 ACRES

"Damnica" tender area is dedicated to the exploration of unconventional prospects within the onshore part of the Baltic Basin. Shale oil and shale gas prospective intervals include the Upper Cambrian (Furongian), Ordovician (Caradocian) and Silurian (Llandovery) strata. Tight oil and gas opportunities are also considered in the Middle Cambrian sandstones. Lower Palaeozoic shales constitute both source and reservoir rocks sealed by the overlying shales and Permian evaporites, while Middle Cambrian sandstones are another reservoir rocks documented by four historical conventional oil field discoveries (Żarnowiec, Żarnowiec W, Dębki, Białogóra E) in the vicinity of the tender block.

Shale gas production rates reported at Warblino site (2011) on "Damnica" tender block and exploration sites on the neighboring "Żarnowiec" tender block are believed to be a good prognostics for future continuation of shale gas exploration on the "Damnica" tender area.

Twelve deep boreholes reached the perspective horizons in the "Damnica" tender area and several another boreholes were situated in the close neighborhood.

12



02 TENDER BLOCK DAMNICA

Licensing rounds:
information and opportunities 2017-2018

Location: onshore, part of Ministry of the Environment concession blocks: 7, 8, 27, 28, 47, 48; in block of the following counties and communes: Pomorskie province: Słupsk county, communes: Ustka (participation in the concession block 7.40%), Smołdzino (25.01%), Słupsk (9.48%), Główny (30.57%), Damnica (10.15%), Potęgowo (7.17%), Słupsk city county: commune Słupsk (0.50%); Łębork county: communes Nowa Wieś Łęborska (2.19%), Wicko (6.51%), Łeba (1.02%)

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years), extracting phase – after the investment decision

Type of deposit: Unconventional for oil and gas, conventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Unconventional in the Lower Palaeozoic (Middle and Upper Cambrian, Ordovician, Silurian)
II – Conventional in the Middle Cambrian

Reservoir rock:

I – Upper Cambrian, Ordovician and Silurian claystones and mudstones
II – Middle Cambrian sandstones

Thickness of overburden: ~ 2,990 m

Completed seismic surveys (owner):

1959: Ustka – Kołobrzeg (State Treasury)
1960: Ustka – Łeba (State Treasury)
1968: Darłowo-Słupsk-Łeba (State Treasury)
1971: Darłowo – Wejherowo (State Treasury)
1972: Ustka - Łeba, Żarnowiec – Władysławowo (State Treasury)
1987: Kostrzyn – Łębork (State Treasury)
2011: 53.56 km² Damnica 3D (State Treasury)
2011: PL1-5,600 Poland SPAN (ION)

Structural stage:

Permian-Mesozoic
Lower Palaeozoic

Source rock:

I, II – Upper Cambrian, Ordovician and Silurian claystones and mudstones

Seal rock:

I, II – Upper Cambrian and Silurian (Ludlovian and Pridoli) claystones and mudstones; Zechstein evaporites

Trap type:

I – unconventional
II – structural and stratigraphic traps

Key wells (MD):

Łębork IG 1 (3,310.0 m), Łeba 8 (3,340.0 m)

The proposed minimum work program of prospecting and exploration phase:

Stage I (12 months) – reprocessing and reinterpretation of archival seismic 2D data and geological data
Stage II (12 months) – acquisition 100 km² of new 3D seismic survey or 80 km of 2D survey
Stage III (24 months) – drilling of one exploration well to 3,500 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage IV (12 months) – analysis of obtained data



The deposits identified in the vicinity [G – gas; O – oil]:

Żarnowiec (O) – documented in 1978; cumulative production of crude oil to 2015 – 9.721 ktonnes; cumulative production of associated natural gas to 2015 – 2.46 million m³; production of crude oil in 2015 – 0.11 ktonnes; production of associated natural gas – 0.07 million m³; balance resources of crude oil in 2015 – 42.33 ktonnes; industrial resources of crude oil in 2015 – 1.68 ktonnes; balance resources of natural gas – 6.96 million m³; industrial resources of natural gas in 2015 – 1.39 million m³

Żarnowiec-W (O) – documented in 1990; cumulative production of condensate in 2015 – 4.2 ktonnes; cumulative production of associated natural gas in 2015 – 25.65 million m³; production of condensate in 2015 – 0.04 ktonnes; production of associated natural gas in 2015 – 0.49 million m³; balance resources of oil in 2015 – 17.81 ktonnes; industrial resources of condensate in 2015 – 3.85 ktonnes; balance resources of associated natural gas in 2015 – 2.35 million m³; industrial resources of associated natural gas in 2015 – 1.50 million m³

Dębki (O) – documented in 1978; cumulative production of crude oil in 2015 – 36.169 ktonnes; cumulative production of associated natural gas in 2015 – 10.201 million m³; production of crude in 2015 – 0.61 ktonnes; production of associated natural gas in 2015 – 0.22 million m³; balance resources of crude oil in 2015 – 8.62 ktonnes; industrial resources of crude oil in 2015 – 5.19 ktonnes; balance resources of associated natural gas in 2015 – 3.0 million m³; industrial resources of associated natural gas in 2015 – 4.23 million m³

Białogóra-E (O) – documented in 1995; cumulative production of crude oil in 2015 – 1.32 ktonnes; cumulative production of associated natural gas in 2015 – 2.08 million m³; production of crude oil in 2015 – none; production of associated natural gas in 2015 – none; balance resources of crude oil in 2015 – none; industrial resources of crude oil in 2015 – 0.38 ktonnes; balance resources of associated natural gas in 2015 – none; industrial resources of associated natural gas in 2015 – 1.02 million m³



02 TENDER BLOCK DAMNICA



03 TENDER BLOCK DEBRZNO-CZŁUCHÓW

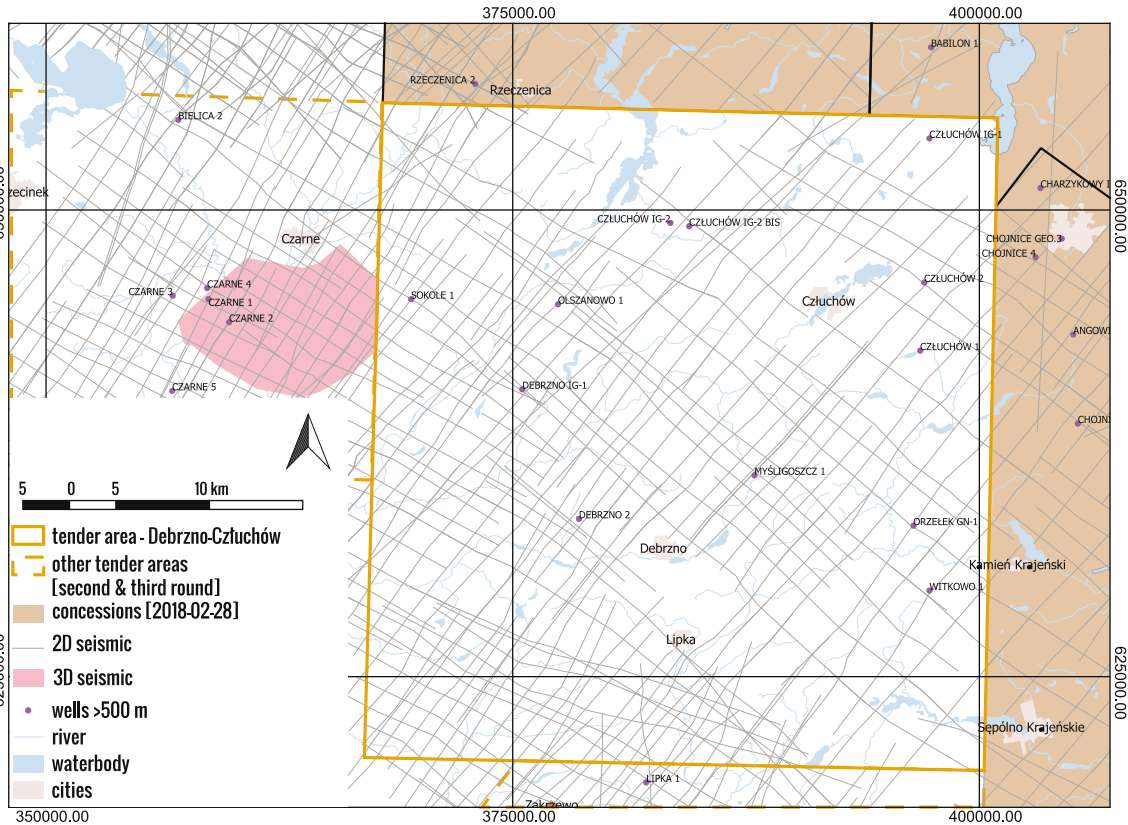
Licensing rounds:
information and opportunities 2017-2018



ACREAGE: 1,158.97 km²
286,388 ACRES

The "Debrzno-Człuchów" tender area is located on the edge of the East European Craton and edge of the West-European Platform, which is widely considered as prospecting target. The hydrocarbon prospects of the "Debrzno-Człuchów" tender area are associated with complex and multistage petroleum system. The main hydrocarbon source rocks comprise of the organic-rich fine-grained Ordovician and Silurian formations. In addition, the Upper Devonian and Carboniferous marls, claystones and mudstones, as well as the Zechstein dolomites are considered secondary source rocks. Lithological, structural and stratigraphic traps are expected. Oil and gas are believed to be accumulated in the Devonian and Carboniferous clastic and carbonate rocks, Permian Rotlie-

gend and Zechstein Main Dolomite. A primary seal is formed by the Zechstein anhydrites and salts; moreover the fine-grained Devonian and Carboniferous rocks form intra-formational seals. Hydrocarbon deposits have been documented in its wide neighborhood, confirming the potential for oil and gas exploration. Nine deep boreholes reached the prospective horizons in the "Debrzno-Człuchów" tender area and several others are situated in the close neighborhood. The 2D seismic investigations include 153 lines of total length of 1,847.32 km. No 3D seismic survey has been performed, so far.



03 TENDER BLOCK DEBRZNO-CZŁUCHÓW

Licensing rounds:
information and opportunities 2017-2018

Location: onshore, part of Ministry of the Environment concession blocks: 107, 127; in block of the following counties and communes: Pomorskie province: Człuchów county, commune: Czarne (participation in the concession block 9.73%), Człuchów urban (1.10%), Człuchów (28.04%), Debrzno (19.29%), Przechlewo (1.94%), Rzeczenica (1.94%), Chojnice county, commune, Chojnice (1.36%); Wielkopolskie province: Złotów county, communes: Złotów (1.87%), Lipka (16.00%), Okonek (0.19%), Zakrzewo (3.44%); Kujawsko-Pomorskie province: Sępólno Krajeńskie county, communes: Kamień Krajeński (5.85%), Sępólno Krajeńskie (4.78%), Więcbork (<0.01%)

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposit

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years), extracting phase – after the investment decision

Type of deposit: Conventional for gas and oil, unconventional for gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Lower Palaeozoic (Ordovician), Upper Palaeozoic (Devonian, Carboniferous) and Permian (Rotliegend)
II – Permian/Zechstein (Main Dolomite)

Reservoir rock:

I – Devonian sandstones and carbonate rocks, Carboniferous sandstones and limestones, Permian (Rotliegend) sandstones
II – Permian (Zechstein/Main Dolomite) dolomites

Thickness of overburden: > 2,000 m

Completed seismic surveys (owner):

1976-1993: 86 lines Białogard - Czarne – Wilcze 2D (State Treasury, PGNiG S.A.);
1988: 1 line Chojnice-Kamień Krajeński (State Treasury);
1992: 1 line Debrzno-Złotów-Zabartowo (PGNiG S.A.);
1975: 1 line Koszalin-Bydgoszcz (State Treasury);
1979: 2 lines Piła-Bydgoszcz (State Treasury);
1997: 1 line Polonaise '97;
2000: 1 line Pomerania (Apache Poland Sp. z o.o.);
1976, 1986-1987: 20 lines Szczecinek – Chojnice 2D, (State Treasury);
1977-78, 1984-89, 1991: 39 lines Szczecinek – Złotów 2D, (State Treasury, PGNiG S.A.);
1979: 1 line Wierzchowo-Drzonowo (State Treasury)

Structural stage:

Permian-Mesozoic; Upper Palaeozoic (Variscan)
Lower Palaeozoic

Source rock:

I – Ordovician claystones and mudstones, Upper Devonian marls, Lower Carboniferous claystones and mudstones
II – Main Dolomite organic-rich interbeds

Seal rock:

I, II – Lower Palaeozoic claystones and mudstones in the fault zones, Devonian and Carboniferous claystones and mudstones interbeds, Zechstein evaporites

Trap type:

I – Devonian and Carboniferous – stratigraphic and structural
I – Rotliegend – structural, tectonic, lithological
II – Main Dolomite – lithological-facies, structural

Key wells (MD):

Człuchów 1 (1,953.0 m); Debrzno IG-1 (5,010.0 m)

The proposed minimum work program of prospecting and exploration phase:

Stage I (12 months) – reprocessing and reinterpretation of archival seismic 2D data
Stage II (12 months) – acquisition 100 km² of new 3D seismic survey or 80 km of 2D survey
Stage III (24 months) – drilling of one exploration well to 5,200 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage IV – (12 months) – analysis of obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Wierzchowo (G) – documented in 1972; cumulative production to 2015 – 514.02 million m³; production in 2015 – none; balance resources in 2015 – 10.78 million m³; industrial resources in 2015 – 10.69 million m³

Brzozówka (O+G) – documented in 1992; cumulative production of crude oil to 2015 – 36.393 ktonnes; production of crude oil in 2015 – none; cumulative production of natural gas to 2015 – 9.797 million m³; production of natural gas in 2015 – none; balance resources of oil in 2015 – none; balance resources of gas in 2015 – none; industrial resources of oil and gas in 2015 – none

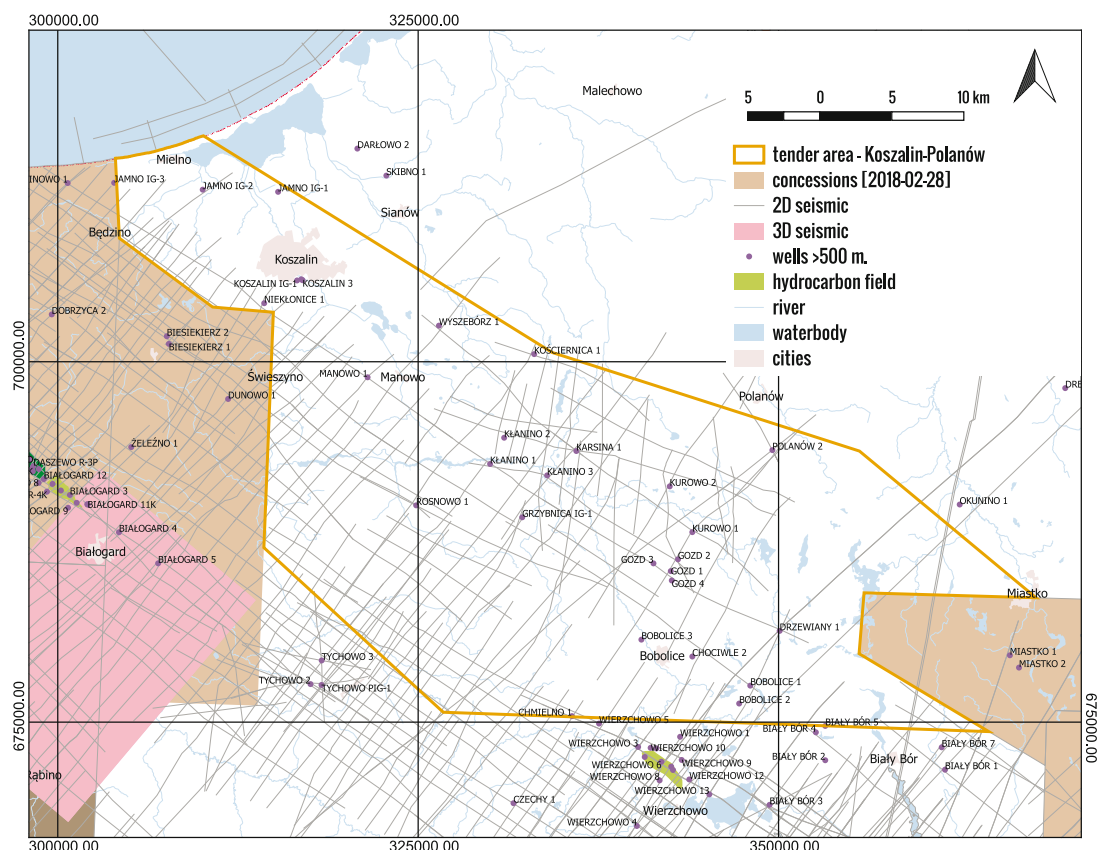
Licensing rounds: information and opportunities 2017-2018



ACREAGE: 1,198.69 km²
296,269 ACRES

tional seals, whereas the Ordovician shales are considered as additional seal in the fault zones. The "Koszalin-Polanów" tender area is located in the classical platform margin zone, which is considered as prospection target worldwide.

Twenty-six deep boreholes reached the prospective horizons in the "Koszalin-Polanów" tender area and several others are situated in the close neighborhood. The 2D seismic investigations include 116 lines of total length of 1,184.58 km. No 3D seismic survey has been performed, so far.



04 TENDER BLOCK KOSZALIN-POLANÓW

Licensing rounds:
information and opportunities 2017-2018

Location: onshore, Part of Ministry of the Environment concession blocks: 44, 45, 64, 65, 66, 85, 86; in blocks of the following administrative districts: Pomorskie province: Słupsk county, commune Kępice (participation in the concession block <0.01%), Bytów county, commune: Miastko (4.92%); Zachodniopomorskie province: Białogard county, communes: Białogard (0.16%), Tychowo (9.10%), Koszalin city county, commune urban Koszalin (6.65%); Koszalin county: communes Bobolice (27.64%), Biesiekierz (1.33%), Będzino (3.64%), Świeszyno (6.77%), Mielno (1.47%), Manowo (15.70%), Sianów (1.57%), Polanów (16.15%), Szczecinek county, communes: Grzmiąca (< 0.01%), Biały Bór (4.89%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposit

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years), extracting phase – after the investment decision

Type of deposit: Conventional for gas and oil

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Lower Palaeozoic (Ordovician), Upper Palaeozoic (Devonian, Carboniferous) and Permian (Rotliegend)
II – Permian (Zechstein/Main Dolomite)

Reservoir rock:

I – Devonian sandstones and carbonate rocks, Carboniferous sandstones and secondary carbonate rocks, Permian (Rotliegend) sandstones
II – Permian (Zechstein/Main Dolomite) dolomites

Thickness of overburden: 1,600–3,300 m

Completed seismic surveys (owner):

1973: 2 lines Koszalin-Bydgoszcz 2D (State Treasury)
1974: 2 lines Regional Profiles 2D (State Treasury)
1975: 1 line Resko-Czaplinek 2D (State Treasury)
1975-1977: 7 lines Białogard-Człuchów 2D (State Treasury)
1976-1978: 5 lines Szczecinek-Chojnice 2D (State Treasury)
1977-1979, 1983-1986: 36 lines Wysoka Kamieńska-Białogard 2D (State Treasury)
1985-1987: 19 lines Koszalin-Polanów-Miastko (State Treasury)
1988-1989: 4 lines Deep Seismic Profiles 2D (State Treasury)
1990, 1992: 12 lines Tychowo-Czechy 2D (PGNiG S.A.)
1991-1992: 16 lines Kłanino-Karsina-Żydowo 2D (PGNiG S.A.)
1992: 1 line Deep Seismic Program of Polish Academy of Science 2D (State Treasury)
1993: 1 line Świdwin-Białogard 2D (PGNiG S.A.)
1994: 2 lines Dobrzyca-Parnowo 2D (PGNiG S.A.)
1995: 4 lines Drzonowo-Wierzchowo 2D (PGNiG S.A.)
2000: 3 lines Pomerania 2D (Apache Poland Sp. z o.o.)
2011: 1 line Dargin 2D (State Treasury)

Structural stage:

Permian-Mesozoic; Upper Palaeozoic (Variscan)
Lower Palaeozoic (Caledonian)

Source rock:

I – Ordovician claystones and mudstones, Upper Devonian marls, Lower Carboniferous claystones and mudstones
II – Main Dolomite organic-rich interbeds

Seal rock:

I, II – Lower Palaeozoic claystones and mudstones in the fault zones; Devonian and Carboniferous claystones and mudstones interbeds; Zechstein evaporites

Trap type:

I – Devonian and Carboniferous – stratigraphic and tectonic
I – Rotliegend – structural, tectonic and stratigraphic
II – Main Dolomite – lithological-facies and structural

Key wells (MD):

Jamno IG-1 (2,801.5 m), Kłanino 1 (3,306.0 m), Kurowo 1 (3,089.7 m)

The proposed minimum work program of prospecting and exploration phase:

Stage I (12 months) – reprocessing and reinterpretation of archival seismic 2D data
Stage II (12 months) – acquisition 100 km² of new 3D seismic survey or 80 km of 2D survey
Stage III (24 months) – drilling of one exploration well to depth of 3,500 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage IV (12 months) – analysis of obtained data



The deposits identified in the vicinity [G – gas; O – oil]:

Daszewo-N (G) – documented in 1985; cumulative production to 2015 – 415.99 million m³ of natural gas; production in 2015 – 25.25 million m³; balance resources in 2015 – 999.47 million m³; industrial resources in 2015 – 225.74 million m³

Daszewo N (O) – documented in 1989; cumulative production to 2015 – 57.893 ktonnes of crude oil; production in 2015 – none; balance resources in 2015 – none; industrial resources in 2015 – none

Daszewo (O) – documented in 1982, cumulative production of crude oil to 2015 – 182.3 ktonnes; cumulative production of natural gas to 2015 – 97.75 million m³; production of crude oil in 2015 – 0.27 ktonnes; production of natural gas in 2015 – none, balance resources of crude oil in 2015 – 5.02 ktonnes; balance resources of natural gas (buffer gas) in 2015 – 27.72 million m³; industrial resources of oil and gas in 2015 - none

Białogard (G) – documented in 1983; cumulative production to 2015 – 595.66 million m³ of natural gas; production of natural gas in 2015 – 14.13 million m³ of natural gas; balance resources of natural gas in 2015 – 59.43 million m³; industrial resources in 2015 – none

Tychowo (O) – documented in 1995; cumulative production of crude oil to 2015 – 20.742 ktonnes; cumulative production of natural gas to 1996 – 5.972 million m³ ; production of oil and gas in 2015 – none, balance resources of crude oil in 2015 – none; balance resources of natural gas in 2015 – none; industrial resources of oil and gas in 2015 – none

Wierzchowo (G) – documented in 1972; cumulative production to 2015 – 514.02 million m³; production in 2015 – none; balance resources in 2015 – 10.78 million m³; industrial resources in 2015 – 10.69 million m³



04 TENDER BLOCK KOSZALIN-POLANÓW

THE GRANTING OF A CONCESSION

One concession instead of three

As a rule, a concession is granted for a period of 10 to 30 years and is divided into 2 phases:

prospecting and exploration phase (which lasts 5 years and can be extended for another 2 years)

production phase.

The period for which a concession is granted depends on the size of a block and the assessment of the prospects of a given deposit.

In the case where a deposit is partly documented, it is also provided that the hydrocarbon production from the deposit can be started even as the prospecting and exploration phase is still underway (the so-called phased in deposit documentation). The condition for the start of production is the award of an investment decision.

Joint application for a concession

In the case where entities jointly obtain a concession, they implement it in accordance with the terms and conditions set out in the cooperation agreement signed among them.

At the stage of the submission of a joint offer in the tender procedure, the entities must define a percentage share of each of them in the costs in case they win the tender and indicate one operator. The operator's percentage share in the costs of geological works, including geological operations, or mining operations, should be more than 50%.

The operator is an entrepreneur obliged to implement its rights and obligations under the concession granted with respect to the public administration authorities and liable with respect to these authorities and third parties, as well as authorized to represent the other entrepreneurs to which the concession has been granted, under the principles laid down in the Act.

05 TENDER BLOCK

SUCHA BESKIDZKA-WIŚNIOWA

Licensing rounds:
information and opportunities 2017-2018



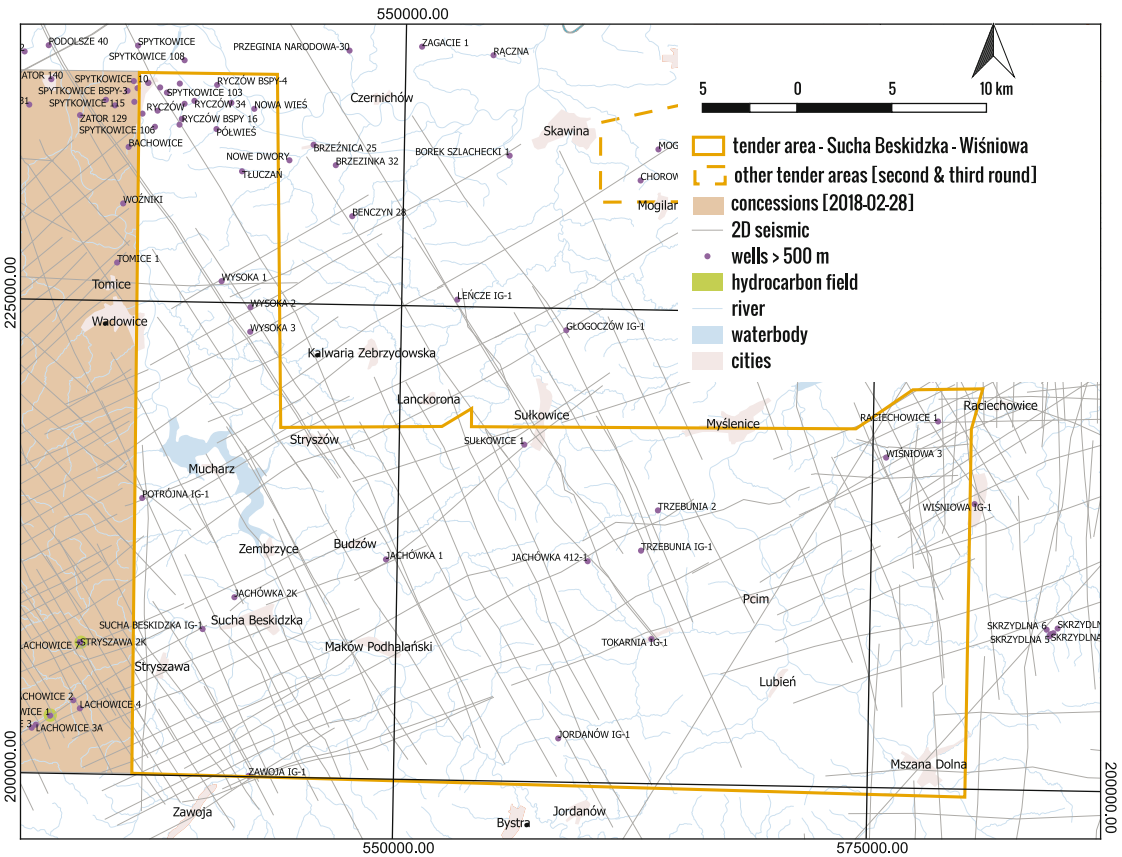
ACREAGE: 981.67 km²
242,576 ACRES

The hydrocarbon prospects in the "Sucha Beskidzka – Wiśniowa" tender area are related to three working petroleum systems developed in the Cretaceous – Paleogene flysch deposits of the Outer Carpathians, Miocene molasses of the Carpathian Foredeep, and Palaeozoic – Mesozoic basement. The flysch oil-factory is working as the multi-story system of nappes, in which source and reservoir rocks are folded in imbricated anticlines. These flysch deposits are overthrust over the autochthonous Miocene of the Carpathian Foredeep, in which biogenic gas accumulations are expected at depths between 2,000 and 3,800 m. Below, the gas shows occur up to 4,500 m deep in the Cambrian sandstones, Devonian and Mississippian carbonates,

Pennsylvanian sandstones and Upper Jurassic limestones. Five hydrocarbon deposits have been discovered in the neighborhood of the "Sucha Beskidzka – Wiśniowa" tender area. At least 7 traps documented on the seismic profiles are still waiting for exploration.

Thirty-one deep boreholes reached the prospective horizons in the "Sucha Beskidzka-Wiśniowa" tender area and several others are situated in the close neighborhood. The 2D seismic investigations include 80 lines of total length of 1,968.69 km. No 3D seismic survey has been performed, so far.

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05 TENDER BLOCK SUCHA BESKIDZKA-WIŚNIOWA

Licensing rounds:
information and opportunities 2017-2018

Location: onshore, part of Ministry of the Environment concession blocks: 412, 413, 432, 433; in block of following counties and communes: Małopolskie province: Kraków county, commune: Czernichów (participation in the concession block 0.16%), Limanowa county, communes: Mszana Dolna (3.89%), urban Mszana Dolna (2.41%), Myślenice county, communes: Pćim (9.05%), Lubień (6.05%), Dobczyce (1.04%), Myślenice (6.30%), Raciechowice (0.39%), Tokarnia (6.98%), Sułkowice (2.37%), Wiśniowa (4.91%), Nowy Targ county, commune Rabka-Zdrój (<1%), Sucha Beskidzka county, communes Sucha Beskidzka (2.81%), Jordanów (0.58%), Bystra-Sidzina (0.10%), Budzów (7.48%), Jordanów (5.17%), Zawoja (2.47%), Maków Podhalański (10.32%), Stryżawa (3.92%), Zembrzyce (3.52%), Wadowice county, communes: Wadowice (5.12%), Kalwaria Zebrzydowska (0.69%), Brzeźnica (2.60%), Stryżów (3.35%), Mucharz (2.76%), Lanckorona (1.06%), Spytkowice (2.42%), Tomice (2.09%)

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposit

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years), extracting phase – after the investment decision

Type of deposit: Conventional for gas and oil

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum systems:

- I – Palaeozoic and Mesozoic basement of the Carpathians
- II – Carpathian nappes
- III – Autochthonous Miocene in the Carpathian Foredeep

Reservoir rock:

- I – Cambrian sandstones; Devonian and Lower Carboniferous limestones and dolomites; clastic rocks of the Upper Carboniferous (Productive series); Upper Jurassic limestones
- II – flysch of Magura Nappe, Dukla/Grybów Nappe, Subsilesian Nappe, Silesian Nappe
- III – sandstones and mudstones of the autochthonous Miocene of the Carpathian Foredeep

Thickness of overburden:

- I – 2,000–4,500 m
- II – 500–1,000 m
- III – 2,000–3,800 m

Completed seismic surveys (owner):

- 1972: 2 lines Andrychów-Jordanów Myślenice-Wiśniowa 2D (State Treasury)
- 1973: 1 line Andrychów-Myślenice 2D (State Treasury)
- 1973: 2 lines Andrychów-Myślenice-Rabka 2D (State Treasury)
- 1976: 9 lines Sucha-Rabka 2D (State Treasury)
- 1978: 1 line Żywiec-Wadowice-Gdów 2D (State Treasury)
- 1978, 1983-1984: 5 lines Górnośląskie Zagłębie Węglowe 2D (State Treasury)

- 1986: 1 line Skoczów-Wadowice-Sucha 2D (State Treasury)
- 1992, 1994-1995: 18 lines Myślenice-Limanowa-Czchów 2D (PGNiG S.A.)
- 1993-1995: 17 lines Lachowice-Myślenice 2D (PGNiG S.A.)
- 1995: Myślenice-Lachowice 2D (PGNiG S.A.)
- 1995: 2 lines Żywiec-Wadowice 2D (PGNiG S.A.)
- 1997-1998: 12 lines Zawoja-Sucha Beskidzka 2D (PGNiG S.A.)
- 2001-2002: 7 lines Raciechowice-Stadniki 2D (PGNiG S.A.)
- 2012: 2 lines Karpaty Wst 2D (Energia Karpaty Zachodnie), Sp. z o.o

Structural stage:

Carpathian Orogenic Belt
Palaeozoic and Mesozoic of the West European Platform

Source rock:

- I – Lower Carboniferous clastic rocks, Upper Carboniferous clastic rocks (paralic and limnic series), Middle Jurassic mudstones and claystones
- II – Lower Cretaceous Cieszyn Beds, Wierzowice Beds, Grodziszcze Beds, Lgota Beds; Oligocene Beds – menilite shales
- III – Fine grained clastic rocks of the autochthonous Miocene of the Carpathian Foredeep

Seal rock:

- I – Carboniferous fine-grained clastic rocks and fine-grained clastic rocks of the autochthonous Miocene of the Carpathian Foredeep
- II, III – Fine-grained flysch deposits and fine-grained clastic rocks of the autochthonous Miocene of the Carpathian Foredeep

Trap type:

- I – structural, stratigraphic
- II – structural, structural-lithological, lithological
- III – compaction anticlines, structural, stratigraphic

Key wells (MD):

- Potrójna IG-1 (3,701.0 m), Tokarnia IG-1 (3,936.5 m), Trzebnia IG-1 (3,053.0 m), Jordanów IG-1 (3,877.0 m)

The proposed minimum work program of prospecting and exploration phase:

Stage I (12 months) – reprocessing and reinterpretation of archival seismic 2D data

Stage II (12 months) – acquisition 50 km of 2D survey

Stage III (24 months) – drilling of one exploration well to 4,500 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters

Stage IV (12 months) – analysis of obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Lachowice-Stryżawa (G) – documented in 1995; unexploited; balance resources in 2015 – 240 million m³

Łapanów (G) – documented in 2008; cumulative production – 18.04 million m³; production in 2015 – 17.92 million m³; industrial resources in 2015 – 307.28 million m³

Łąka (G, O) – documented in 1971; cumulative production of natural gas from the gas-bearing horizons in 2015 – 96.15 million m³; cumulative production of condensate in 2015 – 50.54 tonnes, production of natural gas in 2015 – 3.02 million m³, production of condensate in 2015 – none; balance resources of natural gas in 2015 – 211.72 million m³, balance resources of condensate in 2015 – 4.58 tonnes

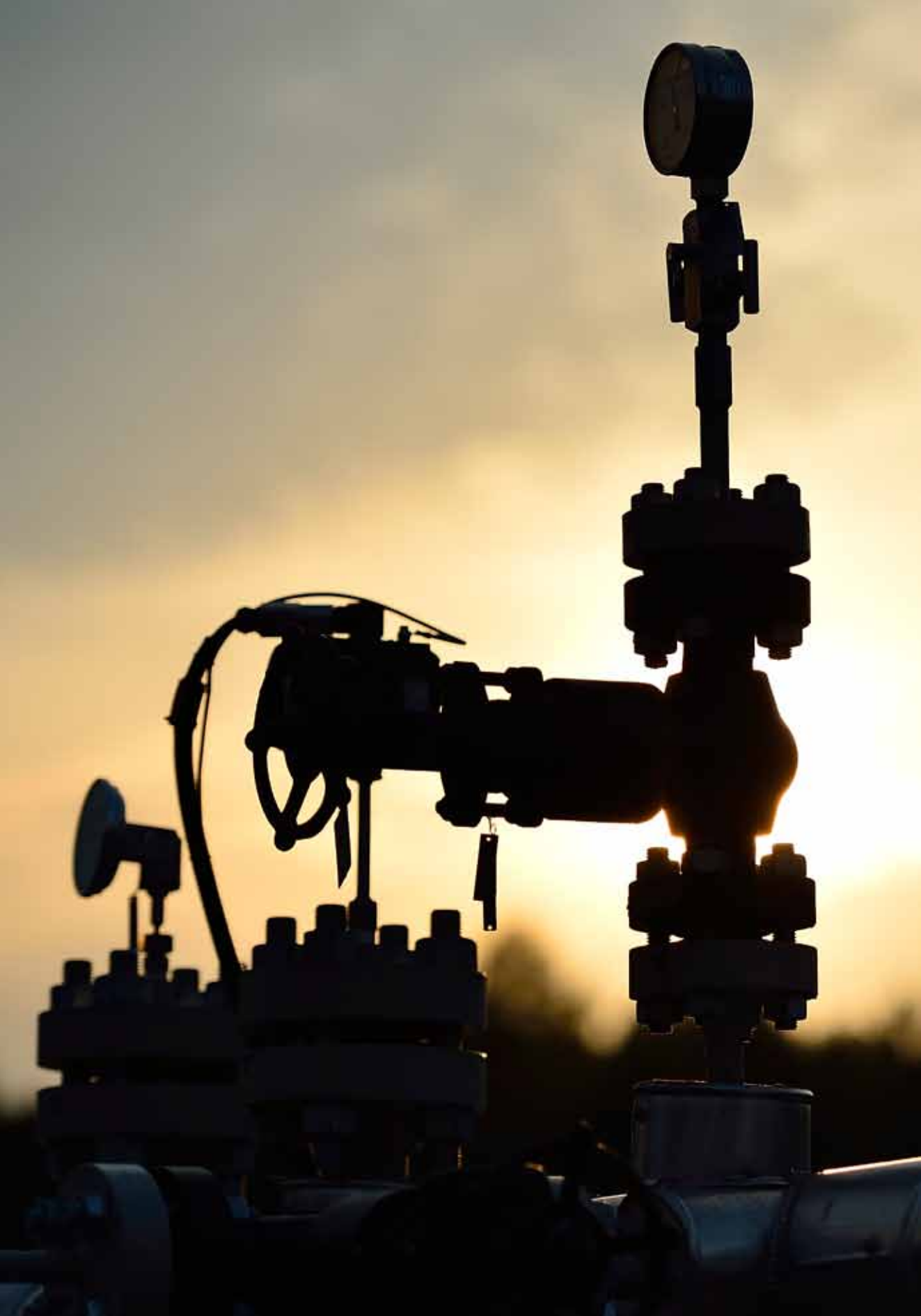
Stopnice (G, O) – documented in 1973; cumulative production of natural gas in 2015 – 42.02 million m³; production of natural gas in 2015 production – none; cumulative production of condensate – none; production of condensate in 2015 – none; balance resources of natural gas in 2015 – 80 million m³; balance resources of condensate in 2015 – 1.5 tonnes; industrial resources of gas and condensate in 2015: none

Raciborsko (G) – documented in 1971; cumulative production of natural gas in 2015 – 25.75 million m³; production of natural gas in 2015 – 0.22 million m³; balance resources of in 2015 – 431.65 million m³; industrial resources in 2015 – 16.31 million m³

Grabina-Nieznanowice (G) – documented in 1971; cumulative production of natural gas in 2015 – 161.25 million m³; production in 2015 – 1.96 million m³; balance resources in 2015 – 326 million m³; industrial resources in 2015 – 16.22 million m³



05 TENDER BLOCK SUCHA BESKIDZKA-WIŚNIOWA



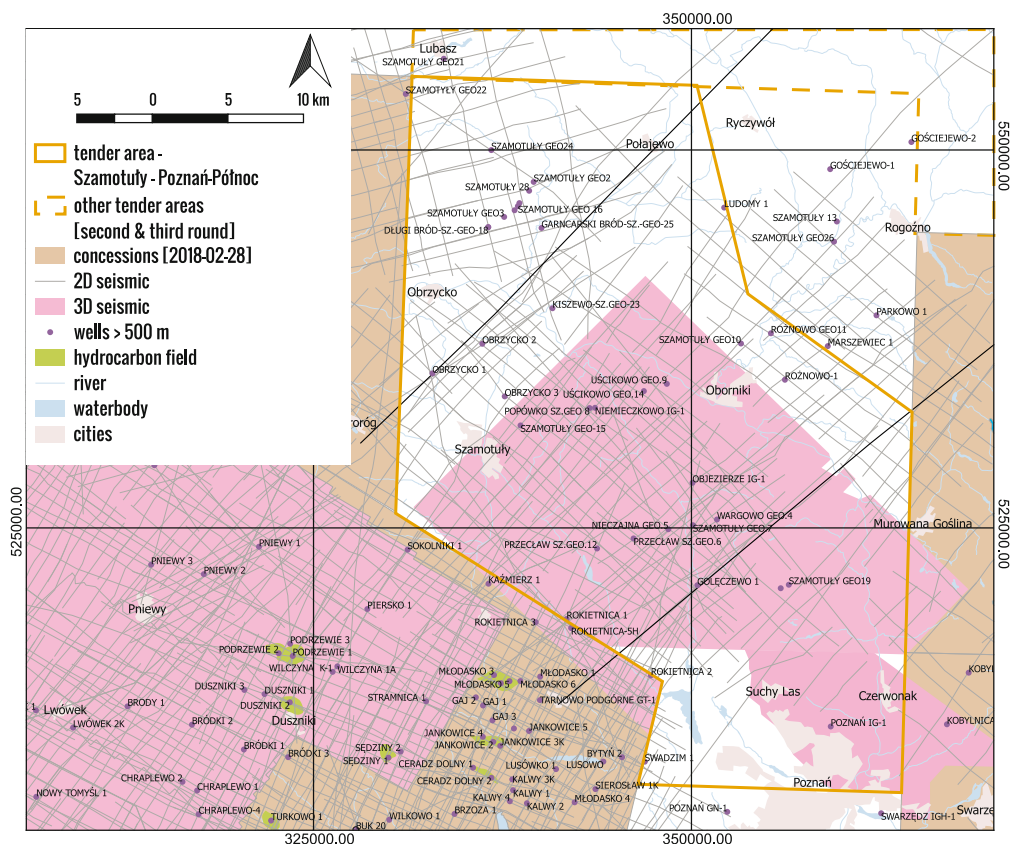
Licensing rounds: information and opportunities 2017-2018



ACREAGE: 1,138.34 km²
281,290 ACRES

traps. Source rocks include Lower Carboniferous interlaying mainly organic-rich mudstones and claystones. Primary seal for hydrocarbon deposits is formed by Zechstein evaporites. Prospectivity of the "Szamotuły-Poznań Północ" is supported by many gas deposits on the neighboring concession blocks, especially those located to the south-west.

Seven deep boreholes reached the prospective horizons in the "Szamotuły-Poznań Północ" tender area and several others are situated in the close neighborhood. The 2D seismic investigations include 184 lines. Three 3D seismic surveys have been performed, so far.



06 TENDER BLOCK SZAMOTUŁY-POZNAŃ PÓŁNOC

Licensing rounds:
information and opportunities 2017-2018

Location: onshore, part of Ministry of the Environment concession blocks: 186, 166, 206; in block of the following counties and communes: Wielkopolskie province: Czarnków-Trzcianka county, communes: Czarnków (participation in the concession block <1%), Lubasz (3.62%), Potajewo (11.73%), Oborniki county, communes: Rogoźno (<1%), Oborniki (29.56%), Ryczywół (3.22%) Poznań City county, commune Poznań City (8.91%) Poznań county, communes: Dopiewo (<1%), Murowana Goślina (3.85%), Czerwonak (2.54%), Tarnowo Podgórne (1.37%), Rokietnica (5.35%), Suchy Las (10.18%), Szamotuły county, communes: Obrzycko (6.64%), Obrzycko City (<1%), Szamotuły (11.54%), Ostroróg (<1%), Kaźmierz (<1%)

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposit

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years), extracting phase – after the investment decision

Type of deposit: Conventional and unconventional for gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum systems:

I – Conventional in the Upper Palaeozoic (Carboniferous) and Permian (Rotliegend, Zechstein/Zechstein Limestone and Main Dolomite)

II – Unconventional (tight gas) in the Rotliegend and Carboniferous sandstones

Reservoir rock:

I – Rotliegend sandstones and Zechstein limestones and dolomites; II – Rotliegend and Carboniferous sandstones

Thickness of overburden: >2,750 m

Completed seismic surveys (owner):

1974: 1 line Deep Seismic Program of Polish Academy of Science 2D (State Treasury); 1976: 1 line Międzychód-Buk 2D (State Treasury); 1976: 1 line Monoklina Przedsudecka 2D (State Treasury); 1976-1978: 18 lines Czarnków-Poznań-Strzelno 2D; (State Treasury); 1977-1982: 79 lines Poznań-Pniewy 2D (State Treasury); 1980-1981: 41 lines Radęcin-Wieleń-Murowana Goślina 2D (State Treasury); 1981-1983: 4 lines Poznań-Września 2D (State Treasury); 1982-1983: 2 lines Wątcz-Gotańcz 2D (State Treasury); 1985-1986: 7 lines Elektrownia Jądrowa Warta 2D (State Treasury); 1995-1999: 16 lines Pniewy-Stęszew 2D (PGNiG S.A.); 2007: 11 lines Obrzycko-Szamotuły 2D (State Treasury); 2011: 1 line AGH28511 2D (State Treasury); 2011: Poznań-N 3D (State Treasury); 2012: Rokietnica-Młodasko 3D (State Treasury); 2014: 1 line Gołęczewo-Szubin 2D (State Treasury); 2014: Gołęczewo 3D (State Treasury)

Structural stage:

Permian-Mesozoic; Upper Palaeozoic (Variscan),

Source rock:

I – Lower Carboniferous claystones and mudstones; Permian (Zechstein/Main Dolomite) organic-rich interbeds
II – Lower Carboniferous claystones and mudstones

Seal rock:

I, II – salt or clay levels within the Rotliegend sandstones; playa sediments in the upper part of Rotliegend sandstones; Zechstein evaporites

Trap type:

I – structural, tectonic, lithological, facies
II – unconventional tight gas: Basin Centered Gas System

Key wells (MD):

Objezierze IG-1 (5,094.5 m), Gołęczewo 1 (4,470.0 m), Obrzycko 1 (4,381.7 m)

The proposed minimum work program of prospecting and exploration phase:

Stage I (12 months) – reprocessing, integration and reinterpretation of archival seismic and well logs data
Stage II (24 months) – drilling of two exploration well to the maximum depth of 6,000 m (TVD) with obligatory coring of prospective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process
Stage III (12 months) – exploration tests in previously found zones and estimation of the production parameters (in case of discover)
Stage IV (12 months) – analysis of obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Młodasko (G) – documented in 1985; cumulative production to 2016 – 479 million m³; production in 2016 – 27.10 million m³; balance resources in 2016 – 17 million m³; industrial resources in 2016 – 30 million m³

Ceradz Dolny (G) – documented in 1978; cumulative production to 2016 – 33.72 million m³; production in 2016 – none; balance resources in 2016 – 85.27 million m³; industrial resources in 2016 – none

Jankowice (G) – documented in 1985; cumulative production to 2016 – 95.51 million m³; production in 2016 – none; balance resources – none; industrial resources – none

07 TENDER BLOCK ZŁOTÓW-ZABARTOWO

Licensing rounds:
information and opportunities 2017-2018

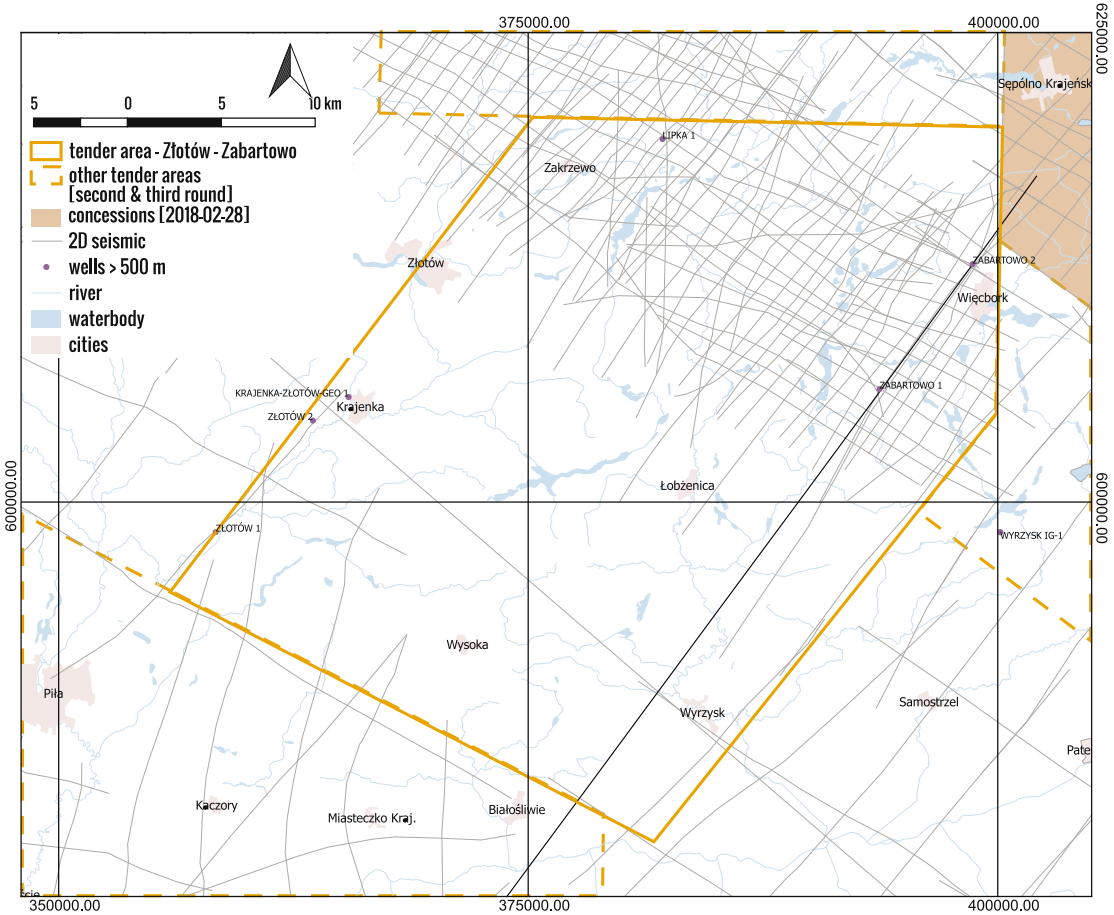


ACREAGE: 1,071.01 km²
264,652 ACRES

Hydrocarbon exploration prospects for "Złotów-Zabartowo" tender area are mostly associated with Rotliegend fluvial and aeolian sandstones that are sealed either by Zechstein evaporites (anhydrite and halite) or intercalations of claystones within the Rotliegend strata. The source rocks are Lower Carboniferous organic-rich mudstones and claystones. The analysis of working petroleum system indicates a possibility of generation, migration and accumulation of hydro-

carbons in the tender block, however, the expected traps would occur at the depths ranging from 4,500 to 5,500 m.

Five deep boreholes reached the prospective horizons in the "Złotów-Zabartowo" tender area. The 2D seismic investigations include 90 lines. No 3D seismic survey has been performed, so far.



07 TENDER BLOCK ZŁOTÓW-ZABARTOWO

Licensing rounds:
information and opportunities 2017-2018

Location: onshore; parts of Ministry of the Environment concession blocks: 126, 127, 146, 147; in blocks of the following counties and communes: Wielkopolskie province: Piła county, communes: Kaczory (participation in the concession block 1.82%), Białośliwie (3.75%), Łobżenica (17.80%), Miasteczko Krajeńskie (0.12%), Wysoka (11.13%), Wyrzysk (9.78%), Złotów county, communes: Złotów (12.02%), urban Złotów (0.71%), Krajenka (11.04%), Lipka (0.52%), Zakrzewo (10.71%); Kujawsko-pomorskie Province: Nakło county, communes: Mrocza (0.53%), Sadki (1.23%) Sępólno Krajeńskie county, communes: Sępólno Krajeńskie (3.31%), Więcbork (15.53%)

Concession type:

prospecting and exploration of hydrocarbons deposits and extracting hydrocarbons from deposit

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years), extracting phase – after the investment decision

Type of deposit: Conventional for gas and unconventional for tight gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum systems:

I – Carboniferous and Permian (Rotliegend)
II – Zechstein (Main Dolomite)

Reservoir rock:

I – Permian (Rotliegend) sandstones
II – Permian (Zechstein/Main Dolomite) deposits

Thickness of overburden: >2,000 m

Completed seismic surveys (owner):

1979: 1 line Piła-Bydgoszcz 2D (State Treasury)
1980-1982: 9 lines Bydgoszcz 2D (State Treasury)
1983-1985: 7 lines Wałcz-Gołańcz 2D (State Treasury)
1986: 2 lines Szczecinek-Złotów 2D (State Treasury)
1987: 2 lines Szczecinek-Chojnice 2D (State Treasury)
1988-1989, 1989-1991: 24 lines Białogard-Czarne-Wilcze 2D (State Treasury, PGNiG S.A.)
1993: 44 lines Debrzno-Złotów-Zabartowo 2D (PGNiG S.A.)
2011: 1 line AGH28511 2D (State Treasury)

Structural stage:

Permian-Mesozoic; Upper Palaeozoic
Lower Palaeozoic

Source rock:

I – Lower Carboniferous claystones and mudstones
II – Permian (Zechstein/Main Dolomite) organic-rich interbeds

Seal rock:

I – claystone interbeds within Rotliegend reservoirs, Zechstein evaporites
II – Zechstein evaporites

Trap type:

I – Carboniferous – stratigraphic and tectonic
I – Rotliegend – structural, tectonic, lithological
II – Zechstein/Main Dolomite – lithologic-facies, structural

Key wells (MD):

Zabartowo 1 (4,823.5 m), Zabartowo 2 (4,569.6 m), Lipka 1 (4,752.0 m)

The proposed minimum work program of prospecting and exploration phase:

Stage I (12 months) – reprocessing and reinterpretation of archival 2D seismic data
Stage II (12 months) – execution of 3D seismic survey (100 km²) or 2D seismic survey (80 km)
Stage III (24 months) – drilling of one well to the depth of 5,000 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage IV (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Wierzychowo (G) – documented in 1972; cumulative production to 2015 – 514.02 million m³; production in 2015 – none; balance resources in 2015 – 10.78 million m³; industrial resources in 2015 – 10.69 million m³

08 TENDER BLOCK ŻARNOWIEC

Licensing rounds:
information and opportunities 2017-2018



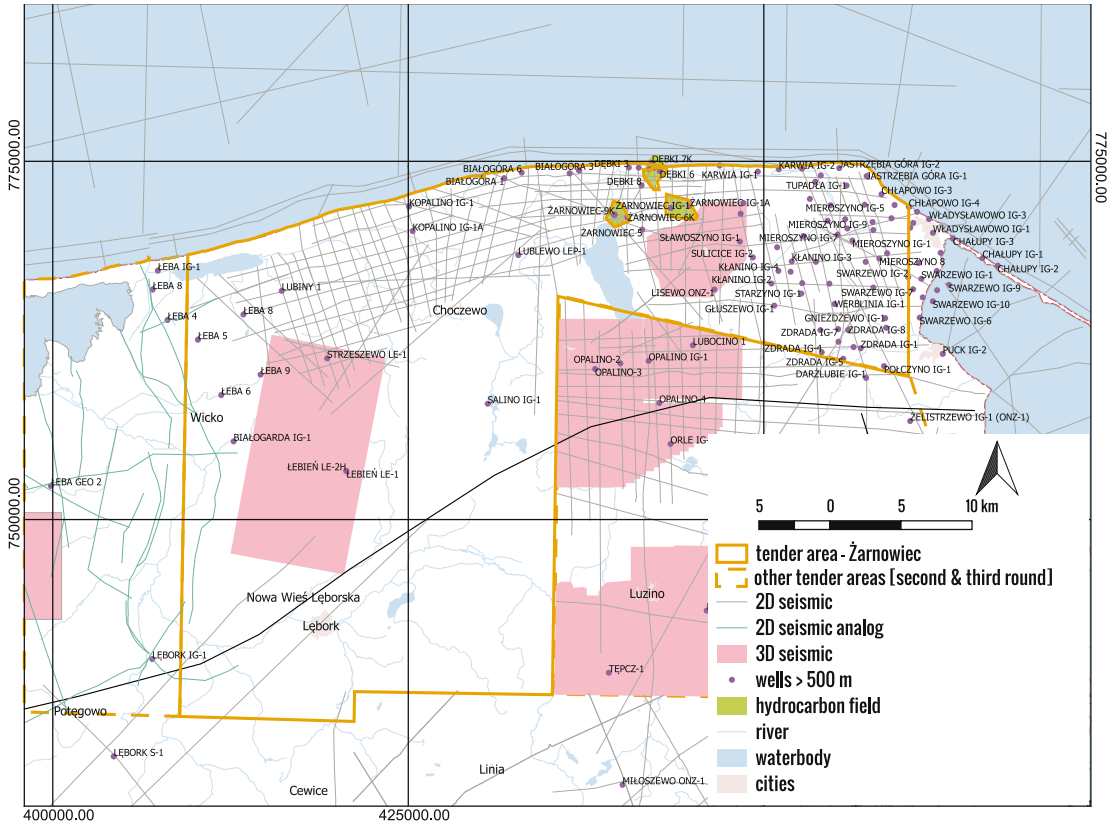
ACREAGE: 1,196.31 km²
295,615 ACRES

“Żarnowiec” tender area is dedicated to the exploration of unconventional and conventional prospects in the onshore part of the Baltic Basin. Shale oil and shale gas accumulations occur within the Upper Cambrian (Furongian), Ordovician (Caradocian) and Silurian (Llandovery) strata. Tight oil and gas and conventional oil accumulations occur in the Middle Cambrian sandstone interval. Lower Palaeozoic shales constitute both source and reservoir rocks sealed by the overlying shales and Permian evaporites, while Middle Cambrian sandstone are a reservoir rock documented by four historical conventional oil field discoveries (Żarnowiec,

Żarnowiec W, Dębki, Białogóra E) in the near vicinity of the tender area. Best shale gas production rates were reported so far on the Lebień and Lublewo sites (in 2010 and 2014 respectively) located on the tender block, making it probably one of the best areas for future shale gas exploration in Poland.

Numerous deep boreholes reached the prospective horizons in the “Żarnowiec” tender area. Also, numerous 2D seismic investigations and two 3D seismic surveys have been performed, so far.

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08 TENDER BLOCK ŻARNOWIEC

Licensing rounds:
information and opportunities 2017-2018

Location: onshore, part of Ministry of the Environment concession blocks: 8, 9, 28, 29, 48; in block of the following counties and communes: Pomorskie province: Lębork county, communes: Nowa Wieś Lęborska (participation in the concession block 20,22%), Łeba (0,35%), Lębork (1,49%), Cewice (1,28%), Wicko (12,29%), Puck county, communes: Puck urban. (0,01%), Puck (7,31%), Władysławowo (2,40%), Krokowa (15,38%), Słupsk country, communes: Potęgowo (0,02%), Główny (0,35%), Wejherowo country, communes: Gniewino (7,70%), Choczewo (15,30%), Łęczycze (15,91%)

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years), extracting phase – after the investment decision

Type of deposit: Conventional and unconventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum system:

I – Conventional in the Middle Cambrian,

Zechstein/Main Dolomite

II – Unconventional in the Lower Palaeozoic

(Middle and Upper Cambrian, Ordovician, Silurian)

Reservoir rock:

I – Middle Cambrian sandstones, Rotliegend sandstones, Zechstein/Main Dolomite carbonates

II – Upper Cambrian, Ordovician, Silurian claystones and mudstones

Thickness of overburden: 1,600-3,300 m

Completed seismic surveys (owner):

1972: Żarnowiec-Władysławowo-Ustka-Łeba 2D (State Treasury)

1976: Puck Bay Block 2D (State Treasury)

1987: Deep seismic profile GBB10387 2D (State Treasury)

1989: Nuclear Power Plant Żarnowiec 2D (State Treasury)

1992-1994, 2002: Łeba-Żarnowiec 2D, Lubiny-Białogóra Block. (State Treasury)

2003 – 2008: Selected profiles from 2D survey Gdańsk-Kościerzyna (State Treasury)

2013: 35 km² Krokowa 3D (State Treasury); 2013 - 2014 Jackowo 2D (State Treasury)

2009: 125 km² Zwartowo 3D (State Treasury)

Structural stage:

Permian-Mesozoic ; Upper Palaeozoic (Variscan)

Lower Palaeozoic (Caledonian)

Source rock:

I, II – Upper Cambrian, Ordovician and Silurian claystones and mudstones

Seal rock:

I, II – Upper Cambrian, Ludlovian and Pridoli (Silurian) claystones and mudstones (secondary sealing complex), Zechstein evaporites

Trap type:

I – tectonic and stratigraphic

II – unconventional

Key wells (MD):

Żarnowiec IG-1 (3,276.0 m); Darżlubie IG-1 (3,520.0 m)

The proposed minimum work program of prospecting and exploration phase:

Stage I (12 months) – reprocessing and reinterpretation of archival seismic 2D data and geological data

Stage II (36 months) – drilling of one exploration well to 5,000 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters. Drilling second exploration well to 5,000 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters

Stage III (12 months) – analysis of obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Żarnowiec (O) – documented in 1978; cumulative production of crude oil to 2015 – 9.721 ktonnes; cumulative production of associated natural gas to 2015 – 2.46 million m³; production of crude oil in 2015 – 0.11 ktonnes; production of associated natural gas – 0.07 million m³; balance resources of crude oil in 2015 – 42.33 ktonnes; industrial resources of crude oil in 2015 – 1.68 ktonnes; balance resources of natural gas – 6.96 million m³; industrial resources of natural gas in 2015 – 1.39 million m³

Żarnowiec-W (O) – documented in 1990; cumulative production of condensate in 2015 – 4.2 ktonnes; cumulative production of associated natural gas in 2015 – 25.65 million m³; production of condensate in 2015 – 0.04 ktonnes; production of associated natural gas in 2015 – 0.49 million m³; balance resources of associated natural gas in 2015 – 17.81 ktonnes; industrial resources of condensate in 2015 – 3.85 ktonnes; balance resources of associated natural gas in 2015 – 2.35 million m³; industrial resources of associated natural gas in 2015 – 1.50 million m³

Dębki (O) – documented in 1978; cumulative production of crude oil in 2015 – 36.169 ktonnes; cumulative production of associated natural gas in 2015 – 10.201 million m³; production of crude oil in 2015 – 0.61 ktonnes; production of associated natural gas in 2015 – 0.22 million m³; balance resources of crude oil in 2015 – 8.62 ktonnes; industrial resources of crude oil in 2015 – 5.19 ktonnes; balance resources of associated natural gas in 2015 – 3.0 million m³; industrial resources of associated natural gas in 2015 – 4.23 million m³

- 32 **Białogóra-E (O)** – documented in 1991; cumulative production of crude oil in 2015 – 2.917 ktonnes; cumulative production of associated natural gas in 2015 – 2.4185 million m³; production of crude oil in 2015 – none; production of natural gas in 2015 – none; balance resources in 2015 – none; industrial resources in 2015 – none



08 TENDER BLOCK ŻARNOWIEC

THE QUALIFICATION PROCEDURE

Every entity interested in obtaining a concession for the prospecting and exploration of a hydrocarbon deposit and the production of hydrocarbons from a deposit, or a concession for the production of hydrocarbons from a deposit needs to undergo the qualification procedure. During the procedure an entity is assessed in terms of the state security and experience in hydrocarbon exploration and production.

The procedure will end with the issuing of a decision awarding a positive result of the qualification procedure or a refusal to award such a result. A decision awarding a positive result of the qualification procedure will remain valid for 5 years.

Two types of qualification are distinguished:

for an operator	for a consortium member
the requirements include positive opinions of the General Inspector of Financial Information, the Financial Supervision Authority, the Head of the Internal Security Agency and the Head of the Foreign Intelligence Agency and documentation on experience in the prospecting or exploration of hydrocarbon deposits or production of hydrocarbons from deposits	the requirements only include positive opinions of the abovementioned authorities and there is no need to provide documentation on experience in the prospecting or exploration of hydrocarbon deposits or production of hydrocarbons from deposits

The Ministry of the Environment provides a up-to-date register of qualified entities on the website

<https://bip.mos.gov.pl/rejestry-ewidencje-archiwa/departament-geologii-i-koncesji-geologicznych/wykaz-podmiotow-kwalifikowanych/>



The background is a photograph of industrial machinery, likely a refinery or chemical plant, with a strong blue color overlay. Several vertical pipes and valves are visible. Some pipes have yellow and blue safety labels with arrows and hazard symbols. The text is centered over the image.

ROUND 3 15 (9 - 23) TENDER BLOCKS

09 TENDER BLOCK BŁAŻOWA

Licensing rounds:
information and opportunities 2017-2018

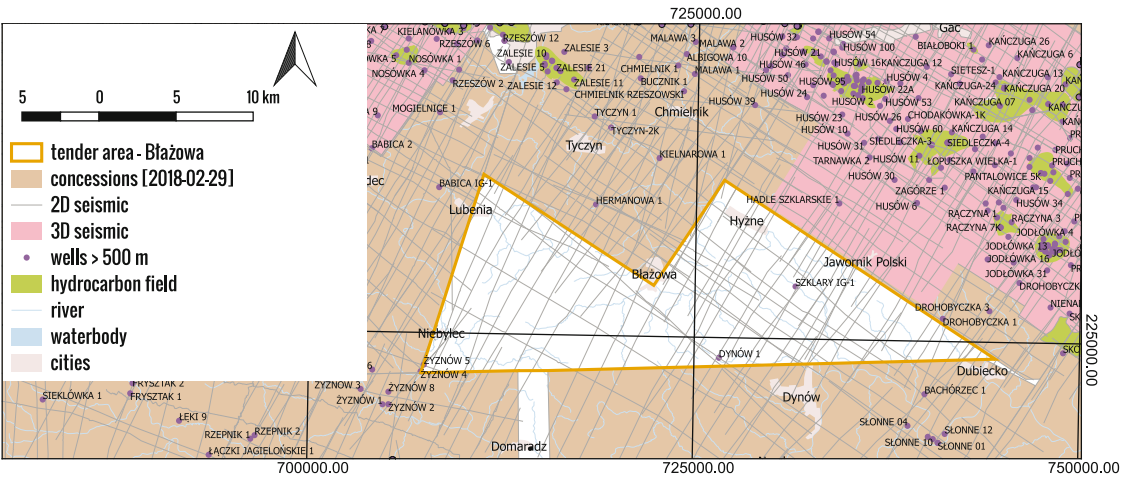


ACREAGE: 270.05 km²
66,731 ACRES

The hydrocarbon prospects in the “Błazowa” tender area are related to three working conventional petroleum systems developed in: (I) Cretaceous – Paleogene flysch deposits of the Outer Carpathians, (II) Miocene molasses of the Carpathian Foredeep and (III) deep Palaeozoic – Mesozoic basement. The first system is expected as the oil-producing from the organic-rich flysch deposits. However, there are still no discoveries in the system in the neighborhood of the “Błazowa”. The second system is developed beneath the Carpathian overthrust at depths below 1,500 m and contains numerous biogenic gas horizons in stratigraphic and anticlinal traps. Four gas deposits (Husów-Albigowa-Krasne, Jodłówka, Rączyna, Zalesie) are exploited from these horizons close to the tender area.

The oil and gas accumulations in the third system are expected below 2,000 m in the Middle and Upper Devonian, Mississippian and Jurassic carbonates, while the Ordovician and Silurian shales are supposed to be the source rocks. Two gas (Zalesie and Trzebowniko) and one oil (Nosówka) deposits are related to this system.

Four deep boreholes reached the perspective horizons in the “Błazowa” tender area and another seven boreholes were situated in the close neighborhood. The 2D seismic investigations include 61 lines of total length 470 km. No 3D seismic surveys have been performed, so far.



09 TENDER BLOCK BŁAŻOWA

Licensing rounds:
information and opportunities 2017-2018

Location: onshore; part of Ministry of the Environment concession blocks: 416 and 417; in areas of the following counties and communes: Podkarpackie province: Brzozów county, communes: Domaradz (participation in the concession blocks: 0.06%), Nozdrzec (0.07%), Przemyśl county, commune: Dubiecko (6.15%), Przeworsk county, commune: Jawornik Polski (2.18%), Rzeszów county, communes: Błażowa (30.86%), Dynów (18.69%), Lubenia (14.89%), Hyżne (13.13%), urban Dynów (0.37%), Tyczyn (0.28%), Strzyżów county, commune: Niebylec (13.32%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years) extracting phase – after the investment decision

Type of deposit: Conventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – flysch of the Skole Nappe

II – Carpathian Foredeep below the Skole Nappe (northern part of the tender area)

III – Palaeozoic–Mesozoic of the Carpathian basement (western part of the tender area)

Reservoir rock:

I – Kuźmina Sandstones, Inoceranian Beds, Kliwa Sandstones

II – sand and sandstones of the Upper Badenian and Lower Sarmatian

III – Precambrian sandstones, carbonate rocks of the Middle and Upper Devonian, Lower Carboniferous and Upper Jurassic

Thickness of overburden:

I – 0–2,500 m

II – 2,000–3,800 m

III – 2,000–4,500 m

Completed seismic surveys (owner):

1977, 1983-1986: 16 lines Błażowa-Bircza 2D (State Treasury)

1982: 2 lines Rzeszów-Zalesie 2D (State Treasury)

1990: 2 lines Błażowa-Leszczyny 2D (PGNiG S.A.)

1991: 1 line Dębica-Sędziszów-Rzeszów 2D (PGNiG S.A.)

1991-1993, 1995: 18 lines Zalesie-Jodłówka-Skopów 2D + 1997 reprocessing (PGNiG S.A.)

2004: 3 lines Babica-Niebylec 2D (State Treasury)

2010: 20 lines Błażowa-Dynów 2D (State Treasury)

Structural stage:

Flysch (Skole and Stebnik nappes); Paleogene–Miocene Palaeozoic–Mesozoic; Precambrian

Source rock:

I – Spas Beds, Inoceranian Beds, Menilite Beds

II – clastic rocks of Upper Badenian and Lower Sarmatian

III – clastic rocks of Ordovician, Silurian, Lower Devonian and Middle Jurassic, clastic-carbonate rocks of the Middle and Upper Devonian and Lower Carboniferous

Seal rock:

I – Spas Beds, Inoceranian Beds, Hieroglyphic Beds, Variegated Shales, Menilite Beds, Krosno Beds

II – claystone layers in autochthonous Miocene; rocks of the Stebnik Unit or flysch of the Skole Nappe above the autochthonous Miocene

III – Ordovician and Silurian for Precambrian deposits; culm facies, Triassic, Jurassic, autochthonous Miocene and Skole succession for Devonian and Carboniferous deposits; autochthonous Miocene rocks and Skole succession for Jurassic deposits

Trap type:

I – structural or structural-lithological

II – structural and stratigraphic

III – structural and stratigraphic

Key wells (TVD):

Szklary IG-1 (1,152.9 m), Dynów 1 (4,281.0 m), Żyznów 4 (1,400.0 m), Żyznów 5 (1,405.0 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analysis of archival geological data

Stage II (24 months) – drilling of one well to the minimal depth of 5,100 m (TVD) and maximal depth of 6,500 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters

Stage III (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Zalesie (G) – documented in 1985; cumulative production to 2016 – 1,359.32 million m³; production in 2016 – 151.52 million m³; balance resources in 2016 – 2,028.27 million m³; industrial resources in 2016 – 280.83 million m³

Nosówka (O) – documented in 1992; cumulative production to 2016 – 240.22 ktonnes; production in 2016 – 4.07 ktonnes; balance resources in 2016 – 47.29 ktonnes; industrial resources in place in 2016 – none

Jodłówka (G) – documented in 1991; cumulative production to 2016 – 2,072.30 million m³; production in 2016 – 7.39 million m³; balance resources in 2016 – 975.11 million m³; industrial resources in place in 2016 – 64.32 million m³

Rączyna (G) – documented in 1989; cumulative production to 2016 – 231.60 million m³; production in 2016 – 0.01 million m³; balance resources in 2016 – 228.53 million m³; industrial resources in place in 2016 – 120.46 million m³

Husów-Albigowa-Krasne (G) – documented in 1975; cumulative production to 2016 – 4,446.89 million m³; production in 2016 – 18.16 million m³; balance resources in 2016 – 1,506.54 million m³; industrial resources in 2016 – 373.84 million m³





10 TENDER BLOCK BRANIEWO-MIŁAKOWO

Licensing rounds:
information and opportunities 2017-2018

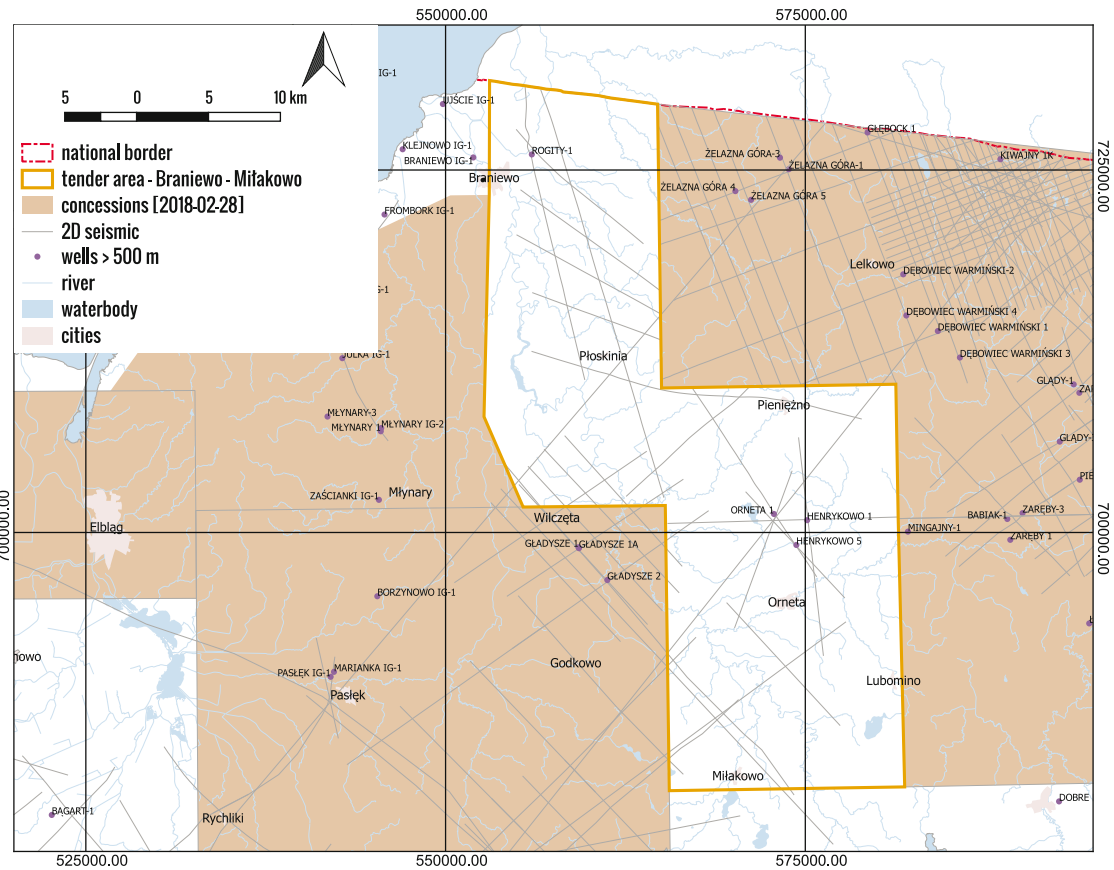


ACREAGE: 787.86 km²
194,684 ACRES

The hydrocarbon prospects in the “Braniewo-Miłakowo” tender area are related to a petroleum system developed in the Lower Palaeozoic, in which the Middle Cambrian sandstones are expected to be the main reservoir rocks. The hydrocarbons are supposed to be generated from the Cambrian, Ordovician and Silurian mudstones and claystones and accumulated in the conventional structural, stratigraphic and lithological traps. Moreover, the Ordovician and Silurian limestones, marls, and fine-clastics are considered as the horizons for unconventional accumulations of tight oil and shale oil. However, there are still no discoveries within and in

the close neighborhood of the “Braniewo-Miłakowo” area, which is in contrast to the numerous deposits discovered in the similar geological setting in Russia (Kaliningrad Oblast). Many oil and gas shows recorded in the Palaeozoic rocks indicate “Braniewo-Miłakowo” area to be promising.

Four deep boreholes reached the prospective horizons in the “Braniewo-Miłakowo” tender area and several others are situated in the close neighborhood. The 2D seismic investigations include 28 lines of total length 312.60 km. No 3D seismic survey has been performed, so far.



10 TENDER BLOCK BRANIEWO-MIŁAKOWO

Licensing rounds:
information and opportunities 2017-2018

Location: onshore; part of Ministry of the Environment concession blocks: 52, 72 and 73; in areas of the following counties and communes: Warmińsko-Mazurskie province: Braniewo county, communes: Braniewo (participation in the concession blocks: 19.65%), Płoskinia (16.85%), Pieniężno (13.43%), Wilczęta (6.07%), urban Braniewo (0.93%), Elbląg county, commune: Godkowo (3.02%), Lidzbark county, communes: Orneta (24.29%), Lubomino (8.13%), Olsztyn county, commune: Świątki (<0.01%), Ostróda county, commune: Miłakowo (7.62%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (4.5 years) extracting phase – after the investment decision

Type of deposit: Conventional and unconventional for oil

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Cambrian conventional and unconventional (tight oil)
II – Lower Palaeozoic unconventional (tight oil, shale oil)

Reservoir rock:

I – Middle Cambrian sandstones
II – Ordovician and Silurian limestones, marls, siltstones and claystones

Thickness of overburden: I, II – 1,700–2,500 m

Completed seismic surveys (owner):

1978: 4 lines Morąg-Olsztyn-Braniewo 2D (State Treasury)
1996: 14 lines Orneta 2D (Frontier Poland Exploration and Producing Company)
2010: 9 lines Braniewo S 2D (State Treasury)
1 line PolandSPAN (ION)

Structural stage:

Caenozoic; Permian-Mesozoic;
Lower Palaeozoic; Precambrian

Source rock:

I, II – Cambrian, Ordovician and Silurian mudstones and claystones

Seal rock:

I, II – Lower Palaeozoic mudstones and claystones and Zechstein evaporites

Trap type:

I – structural, stratigraphic and lithological
II – unconventional (tight, shale)

Key wells (TVD):

Henrykowo 1 (2,611.1 m), Henrykowo 5 (2,675.0 m), Orneta 1 (2,577.0 m), Rogity 1 (2,788.6 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (18 months) – reprocessing, integration and reinterpretation of archival 2D seismic and geological data
Stage II (24 months) – drilling of one well to the maximum depth of 3,500 m (TVD) with mandatory coring of prospective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage III (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

No deposits in the territory of Poland, numerous oil and gas deposits in Russia (Kaliningrad Oblast) in the Middle Cambrian (Slavskoye, Slavinskoye, Gaevskoye, Yagodnoye, Krasnoborskoye, Zapadno-Krasnoborskoye, Deiminskoye, Severno-Krasnoborskoye, Malinovskoye, Ushakovskoye, Isakovskoye, Veselovskoye, Ladushkinskoye) and Ordovician/Silurian (Gusevskoye)

11 TENDER BLOCK BYTÓW

Licensing rounds:
information and opportunities 2017-2018

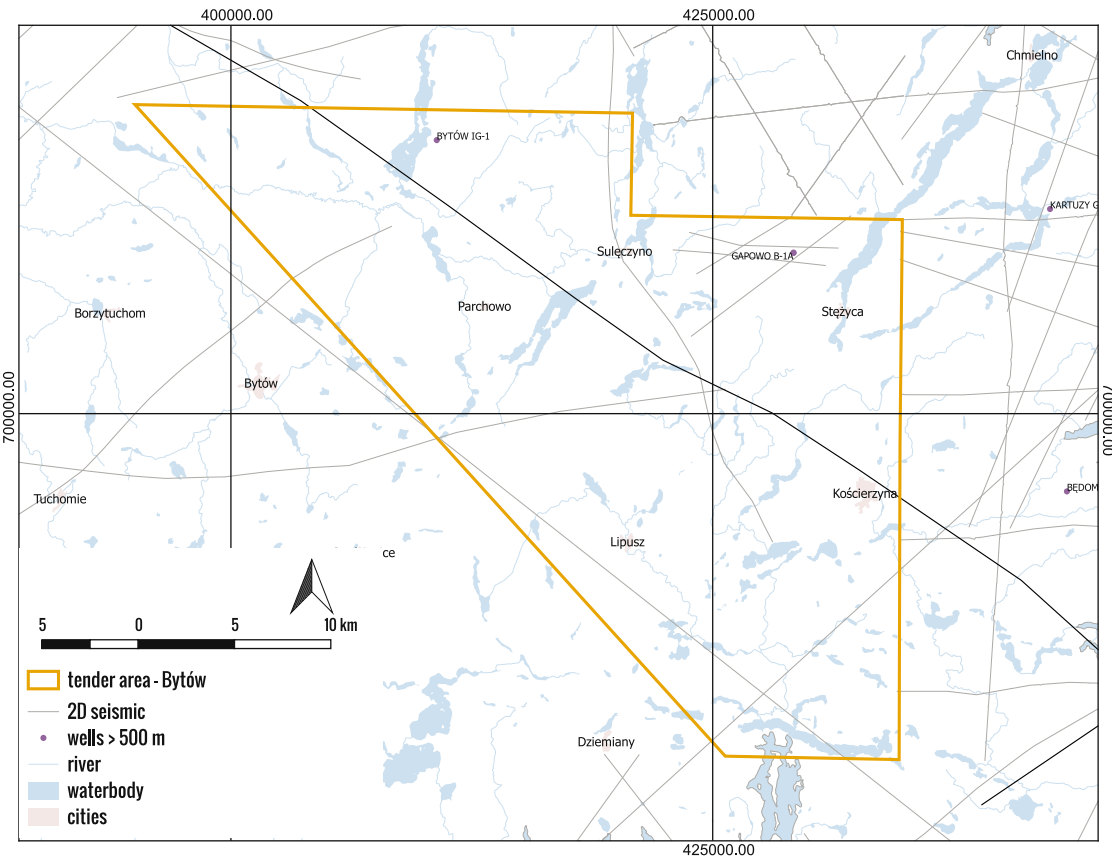


ACREAGE: 732.86 km²
181,093 ACRES

The “Bytów” tender area is dedicated to the exploration of unconventional and conventional prospects in the onshore part of the Baltic Basin. Shale gas accumulations are supposed to occur within the Ordovician (Caradocian) and Silurian (Llandovery) strata. Conventional oil or gas accumulations may be expected in the Lower and Middle Cambrian sandstone intervals. Lower Palaeozoic shales constitute both source and reservoir rocks sealed by the overlying shales and Permian evaporites, while Middle Cambrian sandstone is a reservoir rock documented by historical conventional oil field discoveries (Żarnowiec W, Dębki, Białogóra E).

Shale gas production rates reported at Gapowo site (2014) are a good prognostic and probably indicate one of the best areas for future continuation of shale gas exploration in Poland.

Two deep boreholes reached the perspective horizons on the “Bytów” tender area and another one is situated in the close neighborhood. The 2D seismic investigations include 7 lines of total length of about 113 km. No 3D seismic surveys have been performed, so far.



11 TENDER BLOCK BYTÓW

Licensing rounds:
information and opportunities 2017-2018

Location: onshore; part of Ministry of the Environment concession blocks: 47, 48, 67 and 68; in areas of the following counties and communes: Pomorskie province: Bytów county, communes: Parchowo (participation in the concession blocks: 17.81%), Czarna Dąbrówka (9.29%), Bytów (5.97%), Studzienice (2.92%), Kartuszy county, communes: Sulęcyno (12.86%), Stężyca (8.24%), Sierakowice (0.14%), Chmielno (0.01%), Kościerzyna county, communes: Kościerzyna (25.93%), Lipusz (11.02%), Dziemiany (3.65%), urban Kościerzyna (1.66%), Stara Kiszewa (0.04%), Słupsk county, commune: Dębica Kaszubska (0.46%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years), extracting phase – after the investment decision

Type of deposit: Conventional and unconventional for gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – unconventional
II – conventional

Reservoir rock:

I – Ordovician and Silurian siltstones and claystones
II – Lower and Middle Cambrian sandstones

Thickness of overburden:

I – from about 3,700 m (Bytów IG-1) to about 4,000 m (Kościerzyna IG-1, Gapowo B-1)
II – about 4,250 m (Gapowo B-1)

Completed seismic surveys (owner):

2011: 7 lines 2D (State Treasury)
1 line PolandSPAN (ION)

Structural stage:

Caenozoic; Permian-Mesozoic;
Lower Palaeozoic; Precambrian

Source rock:

I – Ordovician and Silurian siltstones and claystones
II – Cambrian, Ordovician and Silurian siltstones and claystones

Seal rock:

I – Upper Silurian (Ludlow and Pridoli) and Zechstein evaporites
II – fine-grained clastic rocks of Ordovician, Silurian and Zechstein evaporites

Trap type:

I – unconventional (shale gas)
II – structural and stratigraphic

Key wells (TVD):

Bytów IG-1 (2,569.7 m), Gapowo B-1/1 A (4,299.8 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analysis of archival geological data
Stage II (12 months) – execution of 2D seismic survey (100 km)
Stage III (24 months) – drilling of one well to the maximum depth of 5,000 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage IV (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

I – no shale gas type deposits

II – no gas deposits, but in this interval recognized:

Żarnowiec-W (O) – documented in 1990; cumulative production to 2016 – 4.16 ktonnes; production in 2016 – 0.06 ktonnes; balance resources in 2016 – 17.75 ktonnes; industrial resources in 2016 – 3.78 ktonnes

Dębki (O) – documented in 1977; cumulative production to 2016 – 36.69 ktonnes; production in 2016 – 0.52 ktonnes; balance resources in 2016 – 8.10 ktonnes; industrial resources in 2016 – 8.13 ktonnes

Białogóra E (O) – documented in 1995; cumulative production to 2006 – 1.32 ktonnes; production in 2016 – none; balance resources in 2016 – none; industrial resources in 2016 – 0.38 ktonnes

12 TENDER BLOCK CHEŁMNO

Licensing rounds:
information and opportunities 2017-2018

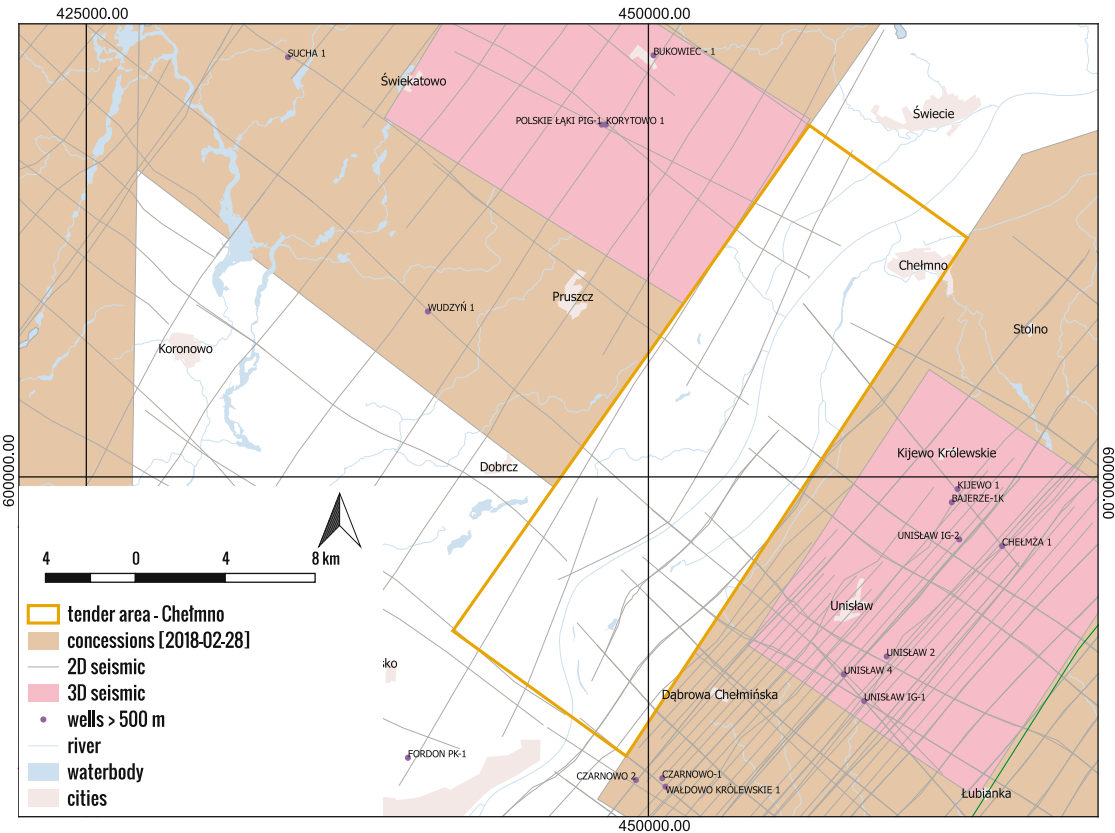


ACREAGE: 248.22 km²
61,336 ACRES

The hydrocarbon prospects in the “Chełmno” tender area are related to three working conventional petroleum systems. The first system is expected as the oil and gas-producing from the Devonian carbonates and/or Carboniferous sandstones, where hydrocarbons were generated either from the Lower Palaeozoic shales (Ordovician and Silurian) and/or Devonian and Carboniferous organic-rich fine-clastics. The second system includes Carboniferous organic-rich fine-clastic as the source rocks and Permian Rotliegend sandstones as the reservoirs. The last system is developed in the Permian (Zechstein/Main Dolomite) strata.

However, there are still no economic discoveries in the “Chełmno” area, although numerous hydrocarbon shows occurred in boreholes.

Seven deep boreholes reached the perspective horizons in the neighborhood of the “Chełmno” tender area. The 2D seismic investigations neighborhood of the include 23 lines of total length of 157 km. No 3D seismic surveys have been performed, so far. In the “Chełmno” adjacent areas, several promising hydrocarbon discoveries have been made by FX Energy/Orlen Upstream companies.



12 TENDER BLOCK CHEŁMNO

Licensing rounds:
information and opportunities 2017-2018

Location: onshore; part of Ministry of the Environment concession blocks: 129 and 149; in areas of the following counties and communes: Kujawsko-Pomorskie province: Bydgoszcz county, communes: Dąbrowa Chełmińska (participation in the concession blocks: 20.16%), Dobrcz (16.30%), Osielesko (2.19%), Bydgoszcz urban county, commune: urban Bydgoszcz (1.71%), Chełmno county, communes: Chełmno (15.01%), Unisław (6.21%), urban Chełmno (4.40%), Kijewo Królewskie (1.53%), Świecie county, communes: Świecie (17.89%), Pruszcz (14.61%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years), extracting phase – after the investment decision

Type of deposit: Conventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Ordovician-Silurian-Devonian (and/or Carboniferous)
II – Carboniferous-Permian/Rotliegend
III – Permian (Zechstein/Main Dolomite)

Reservoir rock:

I – Devonian carbonates (and/or Carboniferous sandstones)
II – Carboniferous and Permian/Rotliegend sandstones
III – Permian/Main Dolomite carbonates

Thickness of overburden:

I > 3,900 m; II > 3,800 m; III > 3,600 m

Completed seismic surveys (owner):

1981-1983: 10 lines Unisław-Toruń 2D (State Treasury)
1981-1982: 9 lines Bydgoszcz 2D (State Treasury)
1984: 1 line Rypin-Grudziądz 2D (State Treasury)
2000-2001: 3 lines Pomerania 2D (Apache Poland Sp. z o.o.)

Structural stage:

Caenozoic; Permian-Mesozoic;
Palaeozoic

Source rock:

I – Ordovician, Silurian and Devonian siltstones and claystones
II – Carboniferous siltstones, mudstones and claystones (and/or older rocks in the basement)
III – Permian/Main Dolomite organic-rich interbeds

Seal rock:

I – Carboniferous fine-clastics and Zechstein evaporites
II – Zechstein evaporites
III – Zechstein evaporites

Trap type:

I, II, III – stratigraphic and structural

Key wells (TVD):

Polskie Łąki PIG-1 (4,427.0 m), Unisław IG-1 (5,355.0 m),
Unisław IG-2 (5,120.0 m), Unisław 2 (4,985.0 m),
Unisław 4 (4,790.0 m), Wałdowo Królewskie 1 (5,433.0 m),
Wudzyń 1 (4,198.0 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – reprocessing, integration and reinterpretation of the archival seismic and borehole data
Stage II (12 months) – execution of 2D seismic survey (at least 50 km)
Stage III (24 months) – drilling of one well to the maximum depth of 5,000 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage IV (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

No deposits discovered in the area and in the close neighborhood

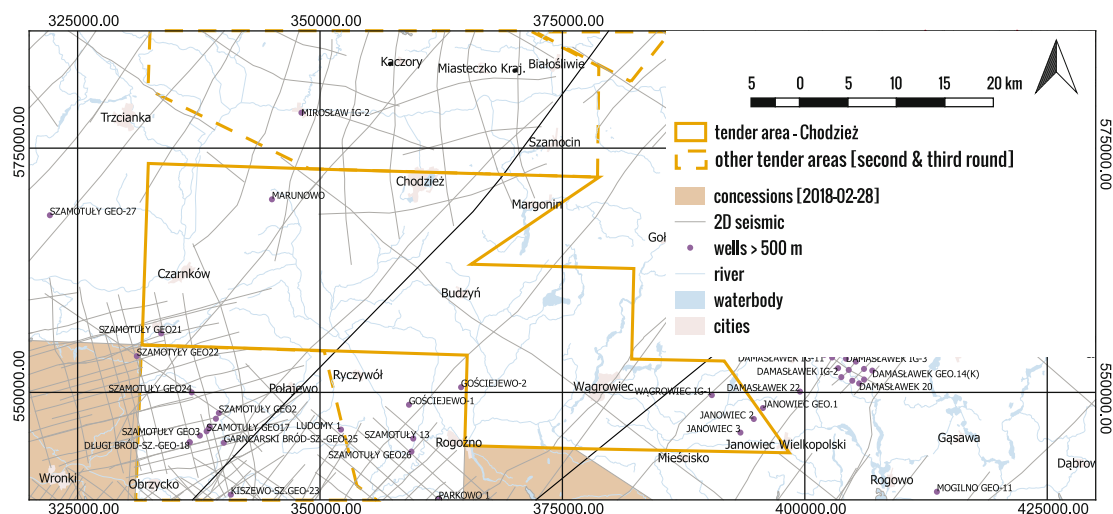
Licensing rounds: information and opportunities 2017-2018



ACREAGE: 1,119.08 km²
276.530 ACRES

is very poorly explored (lack of deep boreholes) and may be an element of the Basin Centered Gas System, yet untested in the Polish Rottliegend Basin.

Five deep boreholes are located in the "Chodzież" tender area, none of them reached the perspective intervals. Two key wells are located in the close neighborhood. The 2D seismic investigations include 28 lines of total length of about 314 km. No 3D seismic surveys have been performed, so far.



13 TENDER BLOCK CHODZIEŻ

Licensing rounds:
information and opportunities 2017-2018

Location: onshore; part of Ministry of the Environment concession blocks: 166 and 167; in areas of the following counties and communes: Kujawsko-Pomorskie province: Żnin county, commune: Janowiec Wielkopolski (participation in the concession blocks: 1.41%), Wielkopolskie province: Chodzież county, communes: Budzyń (17.79%), Chodzież (10.51%), Margonin (5.36%), urban Chodzież (0.93%), Szamocin (0.03%), Czarnków-Trzcianka county, communes: Czarnków (19.96%), Lubasz (3.63%), urban Czarnków (0.91%), Potajewo (0.69%), Trzcianka (0.62%), Oborniki county, communes: Ryczywół (3.24%), Rogoźno (2.52%), Piła county, commune: Ujście (2.43%), Wągrowiec county, communes: Wągrowiec (24.40%), Mieścisko (2.76%), urban Wągrowiec (1.59%), Damasławek (1.10%), Gołańcz (0.12%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years) extracting phase – after the investment decision

Type of deposit: Conventional and unconventional (tight) for gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Conventional in Permian/Rotliegend

II – Unconventional (tight gas) in Permian/Rotliegend

Reservoir rock:

I, II – Permian/Rotliegend sandstones

Thickness of overburden:

I – 4,700–5,000 m; II – 5,000–5,400 m

Completed seismic surveys (owner):

1976–1977: 7 lines Czarnków-Poznań-Strzelno 2D (State Treasury)

1979: 1 line Piła-Bydgoszcz 2D (State Treasury)

1980–1981: 7 lines Radęcin-Wieleń-Murowana Goślina 2D (State Treasury)

1982–1984: 9 lines Wałcz-Gołańcz 2D (State Treasury)

1983: 1 line Kruszewo 2D (State Treasury)

1985–1986: 1 line Warta 2D (State Treasury)

2012: 1 line Obrzycko-Zabartowo (State Treasury)

2013: 1 line Gołęczewo-Szubin (State Treasury)

Structural stage:

Caenozoic; Permian/Zechstein-Mesozoic;

Carboniferous-Permian/Rotliegend

Source rock:

I, II – Lower Carboniferous siltstones and claystones

Seal rock: I, II – Zechstein evaporites

Trap type:

I – stratigraphic and structural; II – unconventional (tight)

Key wells (TVD):

Piła 1/IG-1 (5,482.0 m), Objezierze IG-1 (5,094.5 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analyses of the archival geological data

Stage II (12 months) – execution of 2D seismic survey (at least 100 km)

Stage III (24 months) – drilling of one well to the maximum depth of 5,500 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters

Stage IV (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

I – four gas deposits discovered in far neighborhood:

Młodasko (G) – documented in 1985; production in 2016 – 27.10 million m³; balance resources in 2016 – 17.00 million m³; industrial resources in 2016 – 30.00 million m³

Jankowice (G) – documented in 1985; production in 2016 – none; balance resources in 2016 – none; industrial resources in 2016 – none

Sędziny (G) – documented in 1978; production in 2016 – none; balance resources in 2016 – 80.00 million m³; industrial resources in 2016 – none

Ceradz Dolny (G) – documented in 1978; production in 2016 – none; balance resources in 2016 – 85.27 million m³; industrial resources in 2016 – none

II – no tight gas deposits discovered in the area and in close neighborhood

14 TENDER BLOCK KONIN

Licensing rounds:
information and opportunities 2017-2018

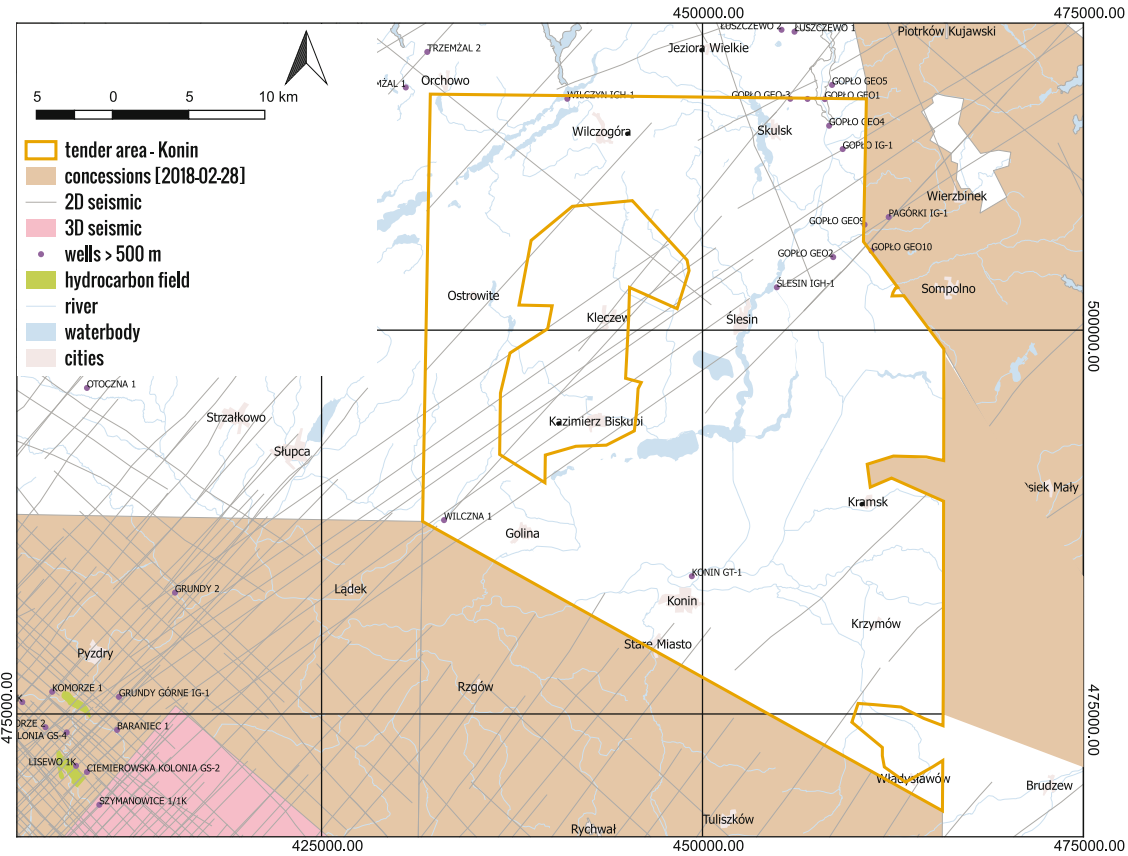


ACREAGE: 1,034.29 km²
255,578 ACRES

The hydrocarbon prospects in the “Konin” tender area are associated with Upper Jurassic and Lower Cretaceous (Lower Berriasian) limestones and dolomites. Reservoirs can be also connected with Lower and Middle (Callovian) Jurassic and Lower Cretaceous (Mogilno Fm.) sandstones and in southern part of the area with Lower Permian sandstones. In these rocks oil and gas are supposed to be either syngenetic in origin or generated from the Palaeozoic basement. Even though there are still no discoveries in the Mesozoic in the “Konin” area and the petroleum play elements

are still not very well constrained. The hydrocarbon shows suggest that petroleum system may be working, leading to future hydrocarbon accumulation discoveries

Five deep boreholes reached the perspective horizons in the “Konin” tender area. The 2D seismic investigations include 20 lines of total length of about 163 km.



14 TENDER BLOCK KONIN

Licensing rounds:
information and opportunities 2017-2018

Location: onshore; part of Ministry of the Environment concession blocks: 209 and 229; in areas of the following counties and communes: Kujawsko-Pomorskie province: Mogilno county, commune: Jeziora Wielkie (participation in the concession blocks: 0.90%), Radziejów county, commune: Piotrków Kujawski (0.76%), Wielkopolskie province: Koło county, communes: Kościelec (1.52%), Koło (0.08%), Osiek Mały (0.07%), Konin urban county, commune: urban Konin (7.93%), Konin county, communes: Ślesin (13.83%), Kramsk (11.36%), Krzymów (8.47%), Golina (7.34%), Wilczyn (6.77%), Skulsk (6.73%), Kazimierz Biskupi (5.05%), Kleczew (4.76%), Sompolno (4.14%), Wierzbinek (2.76%), Stare Miasto (2.68%), Rzgów (0.28%), Słupca county, communes: Ostrowite (6.27%), Orchowo (2.17%), Słupca (2.06%), Powidz (0.80%), Turek county, commune: Władysławów (3.28%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years) extracting phase – after the investment decision

Type of deposit: Conventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Jurassic

Reservoir rock:

I – Jurassic and Lower Cretaceous

Thickness of overburden:

I – 500–1,300 m

Completed seismic surveys (owner):

1974: 1 regional line 2D (State Treasury)
1978–1979: 6 lines Mogilno-Pabianice 2D (State Treasury)
1988–1990: 4 lines Ciechocinek-Brześć Kuj.-Wojszycze 2D (State Treasury)
1996: 5 lines Turek 2D (Texaco)
2010: 4 lines Gniezno-Ślesin 2D (State Treasury)

Structural stage:

Permian/Zechstein-Mesozoic
Palaeozoic/Variscan

Source rock:

I – Middle and Upper Jurassic

Seal rock:

I – Cretaceous, Paleogene and Neogene

Trap type:

I – stratigraphic and structural

Key wells (TVD):

Gopło IG-1 (1,175.4 m), Konin GT-1 (2,660.0 m),
Ślesin IGH-1 (2,570.0 m), Wilczna 1 (3,205.2 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analyses of the archival geological data
Stage II (12 months) – reprocessing of the seismic data
Stage III (24 months) – drilling of one well to the maximum depth of 5,100 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage IV (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

No hydrocarbon deposits have been discovered in the area, so far.

15 TENDER BLOCK LESZNO

Licensing rounds:
information and opportunities 2017-2018

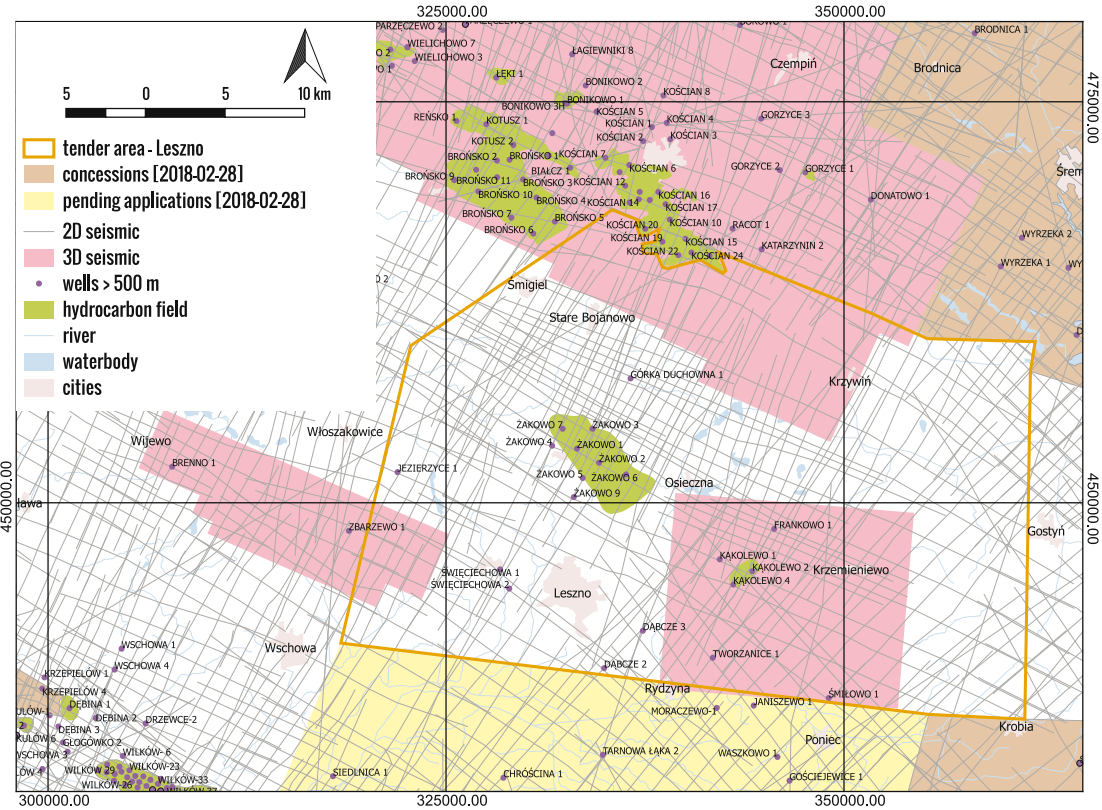


ACREAGE: 1,008.78 km²
249,274 ACRES

Hydrocarbon exploration prospects for the "Leszno" tender area are associated with relative shallowly buried Rotliegend sandstones, mostly aeolian in origin. Hydrocarbon prospection is also related to Zechstein Limestone, Zechstein Main Dolomite and topmost units of the Lower Carboniferous rocks, as stated in the neighborhood areas. Stratigraphic, tectonic and geomorphic gas traps are expected to be encountered. Source rocks include Lower Carboniferous organic-rich mudstones, claystones and sandstones. Extraction of moderate quality methane gas (over 70% of methane content) is expected (excluding small hydrocarbon traps in the Main Dolomite interval).

Primary seal for hydrocarbon deposits is formed by the Zechstein evaporites (anhydrite and salt). "Leszno" Tender area was previously examined by POGC and FX Energy. The newly carried 3D seismic survey and geological research open new possibilities for exploration, particularly in the so-called subtle traps or multi-level traps.

Twenty-one deep boreholes reached the perspective horizons in the "Leszno" tender area and in its neighborhood. The seismic investigations include 186 2D lines of total length of about 2,284 km and three 3D seismic surveys of total acreage of about 334 km².



15 TENDER BLOCK LESZNO

Licensing rounds:
information and opportunities 2017-2018

Location: onshore; part of Ministry of the Environment concession blocks: 225, 226, 245 and 246; in areas of the following counties and communes: Lubuskie province, Wschowa county, commune: Wschowa (participation in the concession blocks: 0.75%), Wielkopolskie province: Gostyń county, communes: Gostyń (7.61%), Poniec (5.90%), Krobia (1.52%), Kościan county, communes: Śmigiel (12.85%), Krzywiń (11.08%), Kościan (2.50%), Leszno county, communes: Osieczna (12.74%), Krzemieniewo (11.21%), Świeciechowa (10.32%), Lipno (10.29%), Rydzyna (6.18%), Włoszakowice (3.88%), Leszno urban county, commune: urban Leszno (3.16%), Wolsztyn county, commune: Przemyśl (0.03%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years) extracting phase – after the investment decision

Type of deposit: Conventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Carboniferous and Permian/Rotliegend

II – Permian (Zechstein/Main Dolomite)

Reservoir rock:

I – Carboniferous and Permian/Rotliegend sandstones

II – Permian/ Zechstein carbonates

Thickness of overburden:

I – 1,800–2,400 m; II – 1,500–1,800 m

Completed seismic surveys (owner):

1975-1977: 29 lines Kościan-Gostyń 2D (State Treasury)

1975-1976: 8 lines Kościan-Śrem 2D (State Treasury)

1975: 1 line Regional seismic 2D (State Treasury)

1975: 1 line Wschowa-Gostyń-Milicz 2D (State Treasury)

1976: 3 lines Fore-Sudetic Monocline 2D (State Treasury)

1976–1979: 3 lines Nowa Sól-Góra-Milicz 2D (State Treasury)

1980: 3 lines Góra-Rawicz 2D (State Treasury)

1986–1989: 26 lines Leszno-Rawicz 2D (State Treasury, PGNiG S.A.)

1988: 2 lines Pogorzela-Krotoszyn 2D (State Treasury)

1988-1989: 9 lines Śrem-Gostyń 2D (State Treasury, PGNiG S.A.)

1989–1990: 9 lines Nowy Tomyśl-Wolsztyn-Leszno 2D (PGNiG S.A.)

1990–1992: 19 lines Sława-Leszno 2D (PGNiG S.A.)

1976: 1 line Gostyń Krotoszyn (State Treasury)

1996: 5 lines Wielichowo-Kościan-Brodnica (PGNiG S.A.)

1996: 24 km² Zbarzewo 3D (PGNiG S.A.)

1997–1999: 56 lines Kościan-Krobia 2D (PGNiG S.A.)

1998: 130 km² Kościan-Krzywin 3D (PGNiG S.A.)

1998–1999: 11 lines Jaraczewo-Pogorzela 2D (PGNiG S.A.)

2013: 180 km² Frankowo-Tworzanice 3D (State Treasury)

Structural stage:

Carboniferous and Permian

Source rock:

I – Carboniferous siltstones and claystones

II – Main Dolomite organic-rich interbeds

Seal rock:

I, II – Zechstein evaporites

Trap type:

I, II – structural

Key wells (TVD):

Jezierzycze 1 (2,668.0 m), Świeciechowa 1 (2,776.8 m),

Świeciechowa 2 (2,200.0 m), Żakowo 6 (2,216.0 m),

Górka Duchowna 1 (2,443.0 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analyses of the archival geological data

Stage II (12 months) – execution of 3D seismic survey

Stage III (24 months) – drilling of one well to the maximum depth of 3,000 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters

Stage IV (12 months) – analysis of the obtained data



The deposits identified in the vicinity [G – gas; O – oil]:

I – two gas deposits discovered in the tender area and another thirteen in the neighborhood:

Bonikowo (G) – documented in 2001; cumulative production to 2016 – 456.71 million m³; production in 2016 – none; balance resources in 2016 – 328.63 million m³; economic reserves in place in 2016 – none

Brońsko (G) – documented in 2002; cumulative production to 2016 – 8702.48 million m³; production in 2016 – 782.1 million m³; balance resources in 2016 – 15,015.66 million m³; industrial resources in 2016 – 13,615.73 million m³

Gorzyce (G) – documented 1995; cumulative production to 2016 – none; production in 2016 – none; balance resources in 2016 – none; industrial resources in 2016 – none;

Góra (G) – documented in 1977; cumulative production to 2016 – 1234.78 million m³; production in 2016 – 35.56 million m³; balance resources in 2016 – 87.58 million m³; industrial resources in 2016 – 61.87 m³

Kandlewo (G) – documented in 1994; cumulative production to 2016 – none; production in 2016 – none; balance resources in 2016 – 239.53 million m³; industrial resources in 2016 – none;

Kąkolewo (G) – documented in 1975; cumulative production to 2016 – none, production in 2016 – none, balance resources in 2016 – 240.00 million m³; industrial resources in 2016 – none

Kościan S (G) – documented in 1999, cumulative production to 2016 – 6,939.84 million m³; production in 2016 – 362.15 million m³, balance resources in 2016 – 3,419.79 million m³; industrial resources in 2016 – 1,842.79 million m³

Kościan S-Ca2 (G) – documented in 2000; cumulative production to 2016 – none; production in 2016 – none; balance resources in 2016 – none

Łęki (G) – documented in 2003; cumulative production to 2016 – 72.09 million m³; production in 2016 – 4.07 million m³, balance resources in 2016 – 31.90 million m³; industrial resources in 2016 – 26.05 million m³

Naratów (G) – documented in 1991; cumulative production to 2016 – 532.54 million m³; production in 2016 – 24.18 million m³, balance resources in 2016 – 78.45 million m³; industrial resources in 2016 – 56.94 million m³

Niechlów (G) – documented in 1991; cumulative production to 2016 – 434.26 million m³; production in 2016 – 14.58 million m³, balance resources in 2016 – 144.72 million m³; industrial resources in 2016 – 16.90 million m³

Szlichtyngowa (G) – documented in 1983; cumulative production to 2016 – 416.56 million m³; production in 2016 – 25.48 million m³, balance resources in 2016 – 163.46 million m³; industrial resources in 2016 – 138.21 million m³

Wilków (G) – documented in 1981; cumulative production to 2016 – 3,679.59 million m³; production in 2016 – 93.66 million m³, balance resources in 2016 – 712.58 million m³; industrial resources in 2016 – 602.68 million m³

Zakrzewo (G) – documented in 1975; cumulative production to 2016 – none; production in 2016 – none, balance resources in 2016 – 210.00 million m³; industrial resources in 2016 – none

Żakowo (G) – documented in 1972; cumulative production to 2016 – none; production in 2016 – none, balance resources in 2016 – 2,150.00 million m³; industrial resources in 2016 – none

Żuchlów (G) – documented in 1978; cumulative production to 2016 – 23,628.09 million m³; production in 2016 – 213.49 million m³, balance resources in 2016 – 891.92 million m³; industrial resources in 2016 – 367.80 million m³



15 TENDER BLOCK LESZNO



16 TENDER BLOCK ORLE

Licensing rounds:
information and opportunities 2017-2018

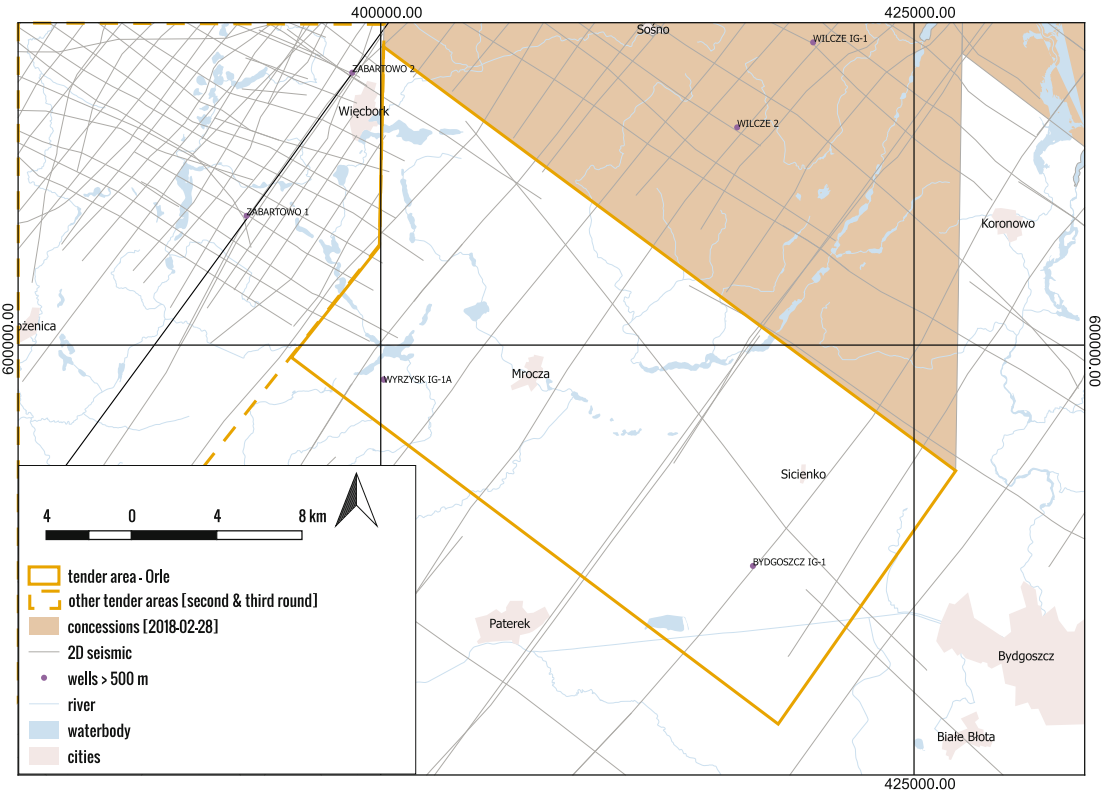


ACREAGE: **423.43 km²**
104,631 ACRES

The “Orle” tender area is located on the western slope of the Eastern European platform. Here, in this strongly tectonically dislocated area, the Lower Carboniferous and Devonian form the substructure of the Permian basin. The hydrocarbon reservoirs have not been documented in the area yet, but encouraging results of hydrocarbon exploration on the (adjacent to the north-east) Orlen Upstream concession area, encourage cautious optimism. Gas deposits have been found in the Devonian (Famennian) carbonates and in the Devonian and Carboniferous sandstones, there. Gas was probably generated from the Late Silurian and/or Ordovician black shales.


In the “Orle” area it is also possible to discover gas deposits in the Permian/Rotliegend aeolian and fluvial sandstones. They were found in the (neighboring from the west) “Złotów-Zabartowo” tender area (the so-called Zabartowo sandstones).

Three deep boreholes reached the perspective horizons in the “Orle” tender area. Below the Zechstein, Rotliegend and Devonian deposits, the Silurian sediments were drilled in one of them at depth of about 5,500 m. The 2D seismic investigations include 16 lines of total length about 153 km.



16 TENDER BLOCK ORLE

Licensing rounds:
information and opportunities 2017-2018

 **Location:** onshore; part of Ministry of the Environment concession blocks: 127, 128, 147 and 148; in areas of the following counties and communes: Kujawsko-Pomorskie province: Bydgoszcz county, communes: Sicienko (participation in the concession blocks: 32.28%), Białe Błota (1.55%), Koronowo (0.24%), Nakło county, communes: Mrocza (30.24%), Nakło nad Notecią (15.67%), Szubin (0.11%), Sadki (<0.01%), Sępólno county, communes: Więcbork (12.30%), Sośno (7.62%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (4 years) extracting phase – after the investment decision

Type of deposit: Conventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Carboniferous and Permian/Rotliegend
II – Permian (Zechstein/Main Dolomite)

Reservoir rock:

I – Carboniferous and Permian/Rotliegend sandstones
II – Permian (Zechstein/Main Dolomite) carbonates

Thickness of overburden:

I – 4,200 - 4,400 m
II – 3,500 - 4,000

Completed seismic surveys (owner):

1978: 1 line Piła-Bydgoszcz 2D (State Treasury)
1980-1982: 12 lines Bydgoszcz 2D (State Treasury)
1992-1993: 3 lines Debrzno-Złotów-Zabartowo 2D (PGNIG S.A.)

Structural stage:

Caenozoic; Permian-Mesozoic
Carboniferous

Source rock:

I – Lower Carboniferous siltstones and claystones
II – (hypothetic) Main Dolomite sediments

Seal rock:

I – Zechstein evaporites, Rotliegend fine-clastics interbeds
II – Zechstein evaporites

Trap type:

I – stratigraphic and tectonic
II – structural, tectonic and lithological
III – lithological (facies-determined) and structural

Key wells (TVD):

Bydgoszcz IG-1 (5,616.0 m), Wyrzysk IG-1 (3,654.5 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analyses of the archival geological data
Stage II (24 months) – drilling of one well to the maximum depth of 5,000 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage III (12 months) – analysis of the obtained data

The deposits identified in the vicinity

[G – gas; O – oil]:

No deposits have been discovered in the selected area and neighborhood.

17 TENDER BLOCK

PIŁA

Licensing rounds:
information and opportunities 2017-2018



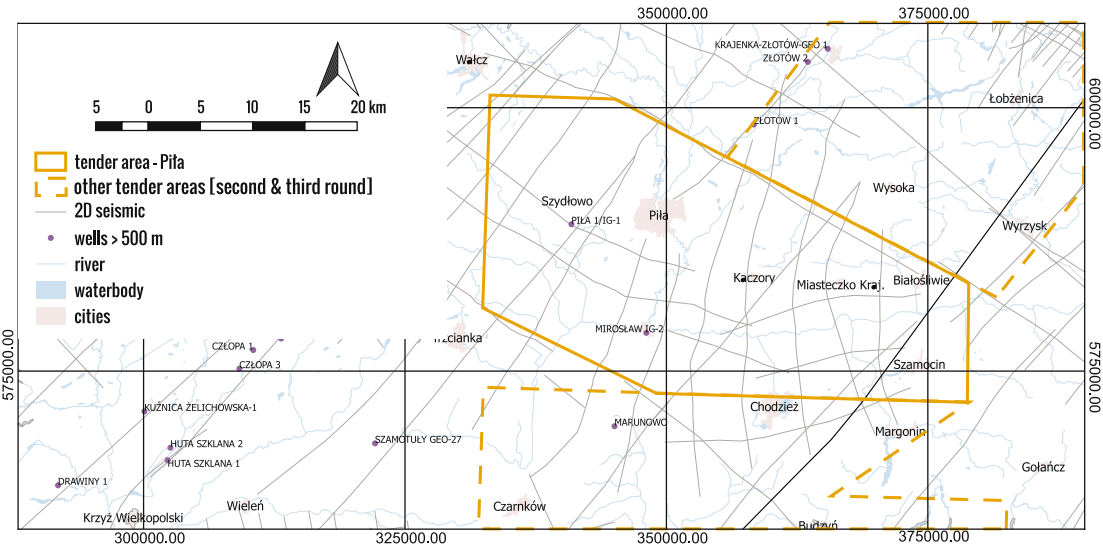
ACREAGE: 943.37 km²
233,112 ACRES

The hydrocarbon exploration prospects for the "Piła" tender area are associated with deeply buried Rotliegend sandstones, mostly aeolian in origin. Deep burial of reservoir rocks, exceeding from 4,500 up to 5,000 m, results in conventional and unconventional (tight) gas traps suite, characterized by moderate porosity and low permeability predictions. Source rocks include the Lower (Upper?) Carboniferous organic-rich mudstones and sandstones.

Extraction of a good quality dry gas is expected. Primary seal for hydrocarbon deposits is formed by playa-lake claystones interbedded with aeolian sandstones. Secondary seal is formed by Zechstein evaporites (anhydrite and salt).


The "Piła" tender area is an exciting hydrocarbon prospect because of very poor exploration (only one deep bore-hole). The area may be an element of the Basin Centered Gas System, still untested in the Polish Rotliegend Basin.

Only one deep borehole reached the perspective horizons in the "Piła" tender area. The 2D seismic investigations include 24 lines of total length about 380 km.



17 TENDER BLOCK PIŁA

Licensing rounds:
information and opportunities 2017-2018

 **Location:** onshore; part of Ministry of the Environment concession blocks: 146 and 147; in areas of the following counties and communes: Wielkopolskie province: Chodzież county, communes: Chodzież (participation in the concession blocks: 10.08%), Szamocin (8.68%), Margonin (1.37%), urban Chodzież (0.25%), Czarńków-Trzcianka county, communes: Trzcianka (9.51%), Czarńków (0.16%), Piła county, communes: Szydłowo (18.53%), Kaczory (13.89%), urban Piła (10.88%), Ujście (9.39%), Miasteczko Krajeńskie (7.37%), Białosławie (3.50%), Wysoka (0.40%), Wągrowiec county, commune: Gołańcz (0.09%), Złotów county, commune: Krajenka (2.00%), Zachodniopomorskie province: Wałcz county, commune: Wałcz (3.92%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years) extracting phase – after the investment decision

Type of deposit: Conventional and unconventional for gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – conventional in Permian/Rotliegend

II – unconventional tight gas in Permian/Rotliegend

Reservoir rock:

I, II – Permian/Rotliegend sandstones

Thickness of overburden:

I – 4200 – 5100 m

II – 5000 – 6000 m

Completed seismic surveys (owner):

1977: 1 line Czarńków-Poznań-Strzelno 2D (State Treasury)

1979: 3 lines Piła-Bydgoszcz 2D (State Treasury)

1982: 1 line Bydgoszcz 2D (State Treasury)

1982-1984: 18 lines Wałcz-Gołańcz 2D (State Treasury)

2012: 1 line Obrzycko-Zabartowo (State Treasury)

Structural stage:

Permian-Mesozoic

Source rock:

I, II – Carboniferous siltstones and claystones

Seal rock:

I, II – Zechstein evaporites and Rotliegend fine-clastic interbeds

Trap type:

I – structural and stratigraphic

II – unconventional

Key wells (TVD):

Piła 1/IG-1 (5,482.0 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analyses of the archival geological data

Stage II (12 months) – execution of 2D seismic survey (100 km)

Stage III (24 months) – drilling of one well to the maximum depth of 5,500 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters

Stage IV (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

No deposits have been discovered in the selected area and neighborhood.

18 TENDER BLOCK PROSZOWICE W

Licensing rounds:
information and opportunities 2017-2018

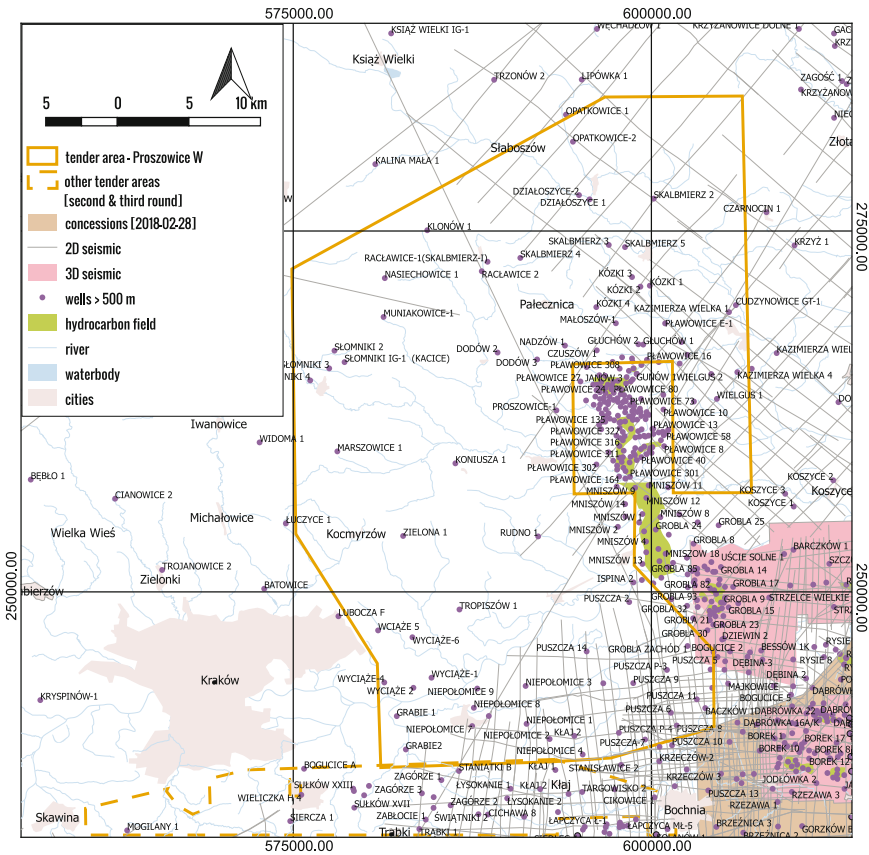


ACREAGE: 1,103.50 km²
272,681 ACRES

The hydrocarbon prospects for the “Proszowice W” tender area are associated with the shallowly buried Oxfordian (Upper Jurassic) organodetrritic limestones and Cenomanian (Upper Cretaceous) fine- and medium-grained glauconitic sandstones, marine in origin. Respectively they are characterized by low to middle and middle to high porosity. Primary seal for hydrocarbon deposits is formed by Senonian marls which directly overlie sandstones or limestones. Secondary seal are Miocene claystones of Krakowieckie Beds. Main source rocks are the Silurian mudstones and Devonian dolomites, while the Carboniferous and Middle Jurassic rocks are expected to be secondary source rocks.


Several oil and gas fields are connected with this conventional Jurassic-Cretaceous petroleum system in the adjacent areas. The “Proszowice W” tender area was previously examined by POGC and Vabush Energy.

In the “Proszowice W” area 84 deep boreholes reached the perspective Jurassic horizons. The 2D seismic investigations include 77 lines of total length 615,4 km. No 3D seismic surveys have been performed, so far. The deeper Devonian, Carboniferous and Middle Jurassic reservoirs are still waiting to be explored. Some oil shows recorded in the Palaeozoic and Jurassic indicate “Proszowice W” area to be promising.



18 TENDER BLOCK PROSZOWICE W

Licensing rounds:
information and opportunities 2017-2018

 **Location:** onshore; part of Ministry of the Environment concession blocks: 373 and 393; in areas of the following counties and communes: Małopolskie province: Bochnia county, communes: Drwinia (participation in the concession blocks: 5.23%), Bochnia (0.95%), Kraków county, communes: Słomniki (7.68%), Kocmyrów-Luborzyca (6.64%), Igołomia-Wawrzeńczyce (5.68%), Michałowice (0.11%), Kraków urban county, commune: urban Kraków (4.34%), Miechów county, communes: Racławice (5.07%), Słaboszów (2.73%), Miechów (2.44%), Proszowice county, communes: Koniusza (8.01%), Proszowice (5.32%), Radziemice (5.25%), Paęcznica (4.12%), Nowe Brzesko (2.18%), Koszyce (0.13%), Wieliczka county, communes: Niepołomice (7.56%), Kłaj (3.01%), Wieliczka (0.32%), Świętokrzyskie province: Kazimierza county, communes: Skalmierz (7.78%), Kazimierza Wielka (6.01%), Czarnocin (1.95%), Pińczów county, communes: Działoszyce (6.38%), Pińczów (1.01%), Złota (0.07%), Michałów (0.03%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years) extracting phase – after the investment decision

Type of deposit: Conventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Palaeozoic-Mesozoic

Reservoir rock:

I – Cenomanian (Upper Cretaceous) glauconitic sandstones and litho-Rauracian (lower part of the Upper Oxfordian, Upper Jurassic) detrital limestones

Thickness of overburden: 350–750 m

Completed seismic surveys (owner):

1975: 3 lines Kazimierza Wielka-Dąbrowa Tarnowska 2D (State Treasury)
1977-1978: 8 lines Bochnia-Czchów-Pilzno 2D (State Treasury)
1987-1989: 18 lines Kazimierza Wielka-Pińczów-Nowy Korczyn 2D (State Treasury, PGNiG S.A.)
1987-1989: 11 lines Niepołomice-Gdów-Myślenice 2D (State Treasury, PGNiG S.A.)
1992-1993: 8 line Słomniki-Pińczów 2D (PGNiG S.A.)
1993: 5 lines Liplas-Puszcza 2D (PGNiG S.A.)
1993: 9 lines Liplas-Grobla-Żukowice 2D (PGNiG S.A.)
2003: 14 lines Puszcza-Krzeczów-Borek 2D (State Treasury)
1989: 1 line Niepołomice-Gdów (State Treasury)

Structural stage:

Caenozoic ; Mesozoic
Palaeozoic

Source rock:

I – ?Ordovician, Silurian, Devonian, Carboniferous and Middle Jurassic

Seal rock:

I – Upper Cretaceous marls and Miocene clay (Krakowieckie Beds) of the Carpathian Foredeep

Trap type: structural

Key wells (TVD):

Puszcza 14 (1,642 m), Dodów 2 (1,267 m), Kózki 1 (800 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analyses of the archival geological data
Stage II (12 months) – execution of 2D seismic survey (70 km)
Stage III (24 months) – drilling of one well to the maximum depth of 2,500 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage IV (12 months) – analysis of the obtained data



The deposits identified in the vicinity [G – gas; O – oil]:

Dąbrówka (G) – documented in 1976; cumulative production to 2016 – 432.22 million m³; production in 2016 – 2.68 million m³; balance resources in 2016 – 25.88 million m³; industrial resources in 2016 – 4.83 million m³

Grabina-Nieznanowice (G) – documented in 1971; cumulative production to 2016 – 163.19 million m³; production in 2016 – 1.91 million m³; balance resources in 2016 – 173.77 million m³; industrial resources in 2016 – 14.31 million m³

Grabina-Nieznanowice S (G) – documented in 1987; cumulative production to 2016 – 17.36 million m³; production in 2016 – 0.11 million m³; balance resources in 2016 – 205.63 million m³; industrial resources in 2016 – 110.43 million m³

Grądy Bocheńskie (G) – documented in 1985; cumulative production to 2013 – 166.89 million m³; production in 2016 – none; balance resources in 2016 – none; industrial resources in 2016 – none

Grobla (O) – documented in 1962; cumulative production to 2016 – 2799.03 tonnes; production in 2016 – 4.28 tonnes; balance resources in 2016 – 39.60 tonnes; industrial resources in 2016 – 14.45 tonnes

Jadowniki (G) – documented in 1991; cumulative production to 2016 none; production in 2016 – none; balance resources in 2016 – 330.00 million m³; industrial resources in 2016 – none

Łapanów (G) – documented in 2008; cumulative production to 2016 – 29.96 million m³; production in 2016 – 11.92 million m³; balance resources in 2016 – 294.26 million m³; industrial resources in 2016 – 295.36

Łąka (G) – documented in 1971; cumulative production to 2016 – 99.3 million m³; production in 2016 – 3.15 million m³; balance resources in 2016 – 208.57 million m³; industrial resources in 2016 – 13.24 million m³

Mniszów (G) – documented in 1966; cumulative production to 2016 – none; production in 2016 – none; balance resources in 2016 – none; industrial resources in 2016 – none

Pławowice (O) – documented in 1964; cumulative production to 2016 – 620.56 tonnes; production in 2016 – 4.76 tonnes; balance resources in 2016 – 82.64 tonnes; industrial resources in 2016 – 15.08 tonnes

Raciborsko (G) – documented in 1971; cumulative production to 2016 – 25.95 million m³; production in 2016 – 0.21 million m³; balance resources in 2016 – 431.44 million m³; industrial resources in 2016 – 16.10 million m³

Rajsko (G) – documented in 1997; cumulative production to 2016 – 33.59 million m³; production in 2016 – 6.24 million m³; balance resources in 2016 – 129.41 million m³; industrial resources in 2016 – 41.41 million m³

Rylowa (G) – documented in 1988; cumulative production to 2016 – 120.68 million m³; production in 2016 – 26.42 million m³; balance resources in 2016 – 424.32 million m³; industrial resources in 2016 – 120.94 million m³

Rysie (G) – documented in 1985; cumulative production to 2016 – 77 million m³; production in 2016 – 0.45 million m³; balance resources in 2016 – 15.01 million m³; industrial resources in 2016 – 0.99 million m³

Szczepanów (G) – documented in 1990; cumulative production to 2016 – 722.7 million m³; production in 2016 – 5.88 million m³; balance resources in 2016 – 191.42 million m³; industrial resources in 2016 – 101.08 million m³



18 TENDER BLOCK PROSZOWICE W

THE TENDER PROCEDURE SCHEME



19 TENDER BLOCK RUDNIK-LIPINY

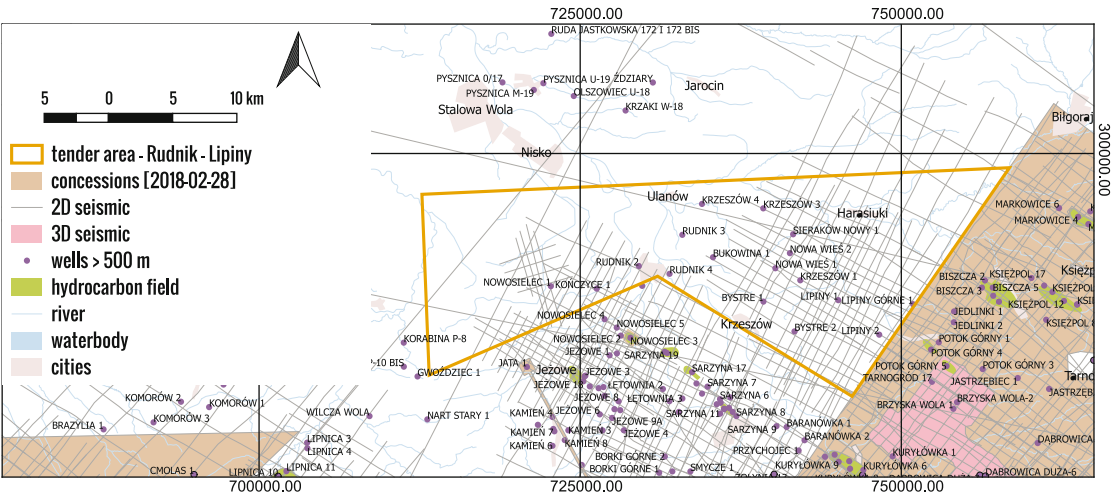
Licensing rounds:
information and opportunities 2017-2018



ACREAGE: **480.45 km²**
118,722 ACRES


The hydrocarbon prospects in the “Rudnik-Lipiny” tender area are related to one working conventional petroleum system developed in the Miocene sediments of the Carpathian Foredeep. Numerous multi-horizontal gas deposits are exploited from these deposits in the southern neighborhood of the tender area. The gas-accumulations are expected within the relatively shallow buried (less than 1,000 m) sandstones and siltstones intercalated with fine-clastic sediments in the structural, lithological and stratigraphic traps. The hydrocarbon potential of the Precambrian clastics in the basement is not well determined.

Seventeen deep boreholes reached the perspective horizons in the “Rudnik-Lipiny” tender area. The 2D seismic investigations include 60 lines of total length of about 595 km. No 3D seismic surveys have been performed, so far.



19 TENDER BLOCK RUDNIK-LIPINY

Licensing rounds:
information and opportunities 2017-2018

 **Location:** onshore; part of Ministry of the Environment concession blocks: 377 and 378; in areas of the following counties and communes: Lubelskie province: Biłgoraj county, communes: Potok Górny (participation in the concession blocks: 12.33%), Biszczka (3.95%), Biłgoraj (3.15%), Podkarpackie province: Leżajsk county, commune: Kuryłówka (1.89%), Nisko county, communes: Harasiuki (18.00%), Nisko (16.98%), Ulanów (12.44%), Rudnik nad Sanem (9.82%), Krzeszów (6.88%), Jeżowe (2.58%), Stalowa Wola county, commune: Bojanów (11.98%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years) extracting phase – after the investment decision

Type of deposit: Conventional for gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Conventional in the autochthonous Miocene of the Carpathian Foredeep

Reservoir rock:

I – Clastic rocks of the autochthonous Miocene of the Carpathian Foredeep

Thickness of overburden: 20.0–40.0 m

Completed seismic surveys (owner):

1984-1985: 16 lines Krzeszów-Biłgoraj (State Treasury)

2000: 16 lines Krzeszów-Bystre (PGNiG S.A.)

1989: 3 lines Krzeszów-Lubaczów-Kalników (PGNiG S.A.)

2003: 9 lines Nowa Dęba-Kamień (State Treasury)

2006: 16 lines Nowosielec-Jata-Chatupki-Tryńcza (State Treasury)

Structural stage:

I – Miocene

II – Lower Palaeozoic

III – Precambrian

Source rock:

I – Sands and sandstones of the autochthonous Miocene (Upper Badenian and Sarmathian) in Carpathian Foredeep

Seal rock:

I – Fine-clastic rocks of the autochthonous Miocene of the Carpathian Foredeep

Trap type:

I – structural, stratigraphic and lithological

Key wells (TVD):

Krzeszów 3 (871.7 m); Krzeszów 4 (797.0 m); Lipiny Górne 1 (976.0 m); Nowa Wieś 1 (1,030.0 m); Nowosielec 1 (675.0 m); Rudnik 2 (960.4 m); Rudnik 3 (872.1 m); Rudnik 4 (980.0 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analyses of the archival geological data

Stage II (12 months) – execution of 2D seismic survey (at least 50 km)

Stage III (24 months) – drilling of one well to the minimum depth of 600 m and maximal depth of 5,550 (TVD), with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters

Stage IV (12 months) – analysis of the obtained data



The deposits identified in the vicinity [G – gas; O – oil]:

Biszczka (G) – documented in 1998; cumulative production to 2016 – 142.07 million m³; production in 2016 – 6.42 million m³; balance resources in 2016 – 116.93 million m³; industrial resources in 2016 – 83.86 million m³

Jeżowe NW (G) – documented in 2008; cumulative production to 2016 – 10.9 million m³; production in 2016 – 0.75 million m³; balance resources in 2016 – 13.84 million m³; industrial resources in 2016 – 10.15 million m³

Książpol (G) – documented in 2003; cumulative production to 2016 – 52.8 million m³; production in 2016 – 4.06 million m³; balance resources in 2016 – 222.18 million m³; industrial resources in 2016 – 13.03 million m³

Kuryłówka (G) – documented in 1989; cumulative production to 2016 – 628.32 million m³; production in 2016 – 24.26 million m³; balance resources in 2016 – 236.67 million m³; industrial resources in 2016 – 56.54 million m³

Lipnica-Dzikowiec (G) – documented in 1969; cumulative production to 2016 – none; production in 2016 – none; balance resources in 2016 – 154.00 million m³; industrial resources in 2016 – none

Markowice (G) – documented in 2010; cumulative production to 2016 – none; production in 2016 – none; balance resources in 2016 – 72.42 million m³; industrial resources in 2016 – 66.66 million m³

Nowosielec (G) – documented in 2009; cumulative production to 2016 – 7.85 million m³; production in 2016 – 0.03 million m³; balance resources in 2016 – 75.15 million m³; industrial resources in 2016 – 31.27 million m³

Potok Górny (G) – documented in 2014; cumulative production to 2016 – 0.94 million m³; production in 2016 – none; balance resources in 2016 – 36.06 million m³; industrial resources in 2016 – none

Sarżyna (G) – documented in 1967; cumulative production to 2016 – 185.86 million m³; production in 2016 – 1.45 million m³; balance resources in 2016 – 41.72 million m³; industrial resources in 2016 – 25.70 million m³

Żołynia Leżajsk (G) – documented in 1962; cumulative production to 2016 – 2,382.17 million m³; production in 2016 – 32.64 million m³; balance resources in 2016 – 544.11 million m³; industrial resources in 2016 – 60.30 million m³



19 TENDER BLOCK RUDNIK LIPINY



20 TENDER BLOCK RYKI

Licensing rounds:
information and opportunities 2017-2018

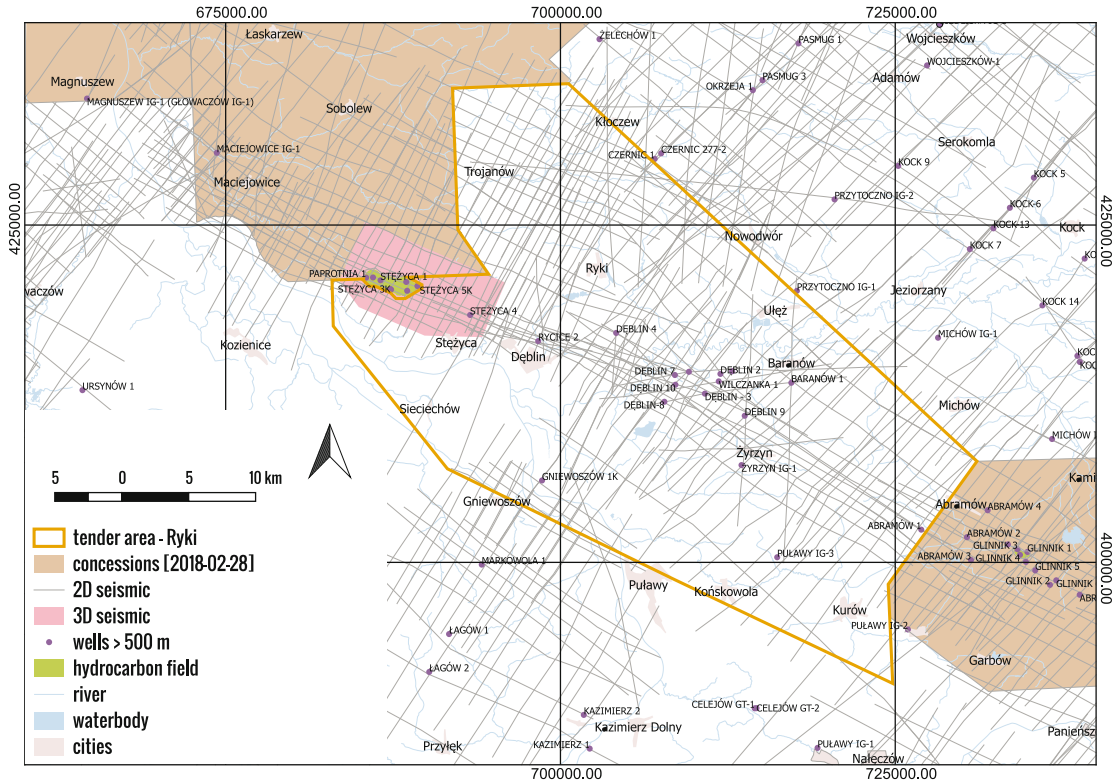


ACREAGE: 1047.73 km²
258,900 ACRES

The petroleum system in the “Ryki” tender area is developed in the Devonian, Mississippian and Pennsylvanian of the Lublin Basin. Three oil and five gas fields have been discovered in the neighborhood of the area, so far. In the Stężycza field, the conventional accumulation of oil and gas is trapped in anticlinal form, in which the hydrocarbons are accumulated in porous alluvial Pennsylvanian sandstones, sealed by fine-grained alluvial-plain facies. In the Glinnik field, the oil accumulation occurs in the thin-layered sandstones and siltstones of the Famennian age. They are sealed by the Visean fine-grained clastics. The saturated horizon reaches 4.3 m in thickness, and the trap area is about 0.6 km².

Two gas-fields (Mełgiew A and B) and numerous hydrocarbon shows occur in the Upper Devonian carbonates, in which intergranular- and fracture-type porosity has prevailed. The tight gas discoveries are expected within.

Seventeen deep boreholes reached the perspective horizons in the “Ryki” tender area and another twelve in the neighborhood. The 2D seismic investigations include 179 lines of total length of about 2,113.5 km. One 3D seismic survey of acreage of about 36.8 km² has been performed, so far.



20 TENDER BLOCK RYKI

Licensing rounds:
information and opportunities 2017-2018

Location: onshore; part of Ministry of the Environment concession blocks: 276, 277, 296 and 297; in areas of the following counties and communes: Lubelskie province: Lubartów county, communes: Abramów (participation in the concession blocks: 4.57%), Michów (0.82%), Puławy county, communes: Żyrzyn (12.33%), Puławy (7.91%), (Kurów 7.53%), Baranów (7.35%), Końskowola (5.49%), urban Puławy (2.58%), Markuszów (0.38%), Natęczów (0.16%), Ryki county, communes: Ryki (14.83%), Stężycza (8.44%), Ułęż (4.91%), Kłoczew (3.82%), Dęblin (3.66%), Nowodwór (1.34%), Mazowieckie province: Garwolin county, commune: Trojanów (6.30%), Kozienice county, communes: Sieciechów (4.32%), Gniewoszew (2.94%), Kozienice (0.31%), Garbatka-Letnisko (0.02%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years) extracting phase – after the investment decision

Type of deposit: Conventional for oil and gas, unconventional for gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – conventional, Palaeozoic (Devonian and Carboniferous)
II – unconventional, Palaeozoic (Devonian)

Reservoir rock:

I – Upper Carboniferous and Upper Devonian (Famennian) clastic deposits; II – Upper Devonian (Frasnian) limestones

Thickness of overburden: 1,150–1,500 m

Completed seismic surveys (owner):

1974: 1 line Rów Lubelski 2D (State Treasury)
1979–1981, 1983–1986–1989, 1991, 1993–1994: 42 lines Tłuszcz-Dęblin-Lublin 2D (State Treasury, PGNiG S.A.)
1985, 1989–1992: 25 lines Wilga-Abramów 2D (State Treasury, PGNiG S.A.)
1992, 1994, 1996: 5 lines Żelechów-Radzyn Podlaski-Kock 2D (PGNiG S.A.)
1993: 2 lines Żelechów-Radzyn Podlaski 2D (PGNiG S.A.)
1995–1997: 60 lines Ryki-Żyrzyn 2D (PGNiG S.A.)
1998: 4 lines Radom-Zamość 2D (Apache Poland)
1999: 8 lines Rycice 2D (Apache Poland)
2003–2004: 19 lines Pionki-Kazimierz 2D (State Treasury)
2004: 1 line Pionki-Kazimierz 3C (State Treasury)
2003: 2 lines Strych-Stężycza 2D (State Treasury)
2005: 2 lines Kock-Tarkawica 2D (State Treasury)
2011: 8 lines Czemic-Ryki 2D (PGNiG S.A.)
1995: 36.8 km² Stężycza 3D (PGNiG S.A.)

Structural stage: Caenozoic; Mesozoic; Palaeozoic

Source rock:

I – Devonian (Frasnian and Famennian) and Carboniferous fine-grained clastic rocks; II – Frasnian limestones

Seal rock:

I – Devonian and Carboniferous fine-grained clastic rocks
II – Frasnian limestones

Trap type:

I – structural, stratigraphic; II – unconventional

Key wells (TVD):

Abramów 1 (4,825.8 m), Dęblin 8 (2,928.1 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analyses of the archival geological data
Stage II (12 months) – execution of 2D seismic survey (at least 100 km)
Stage III (24 months) – drilling of one well to the minimum depth of 600 m and maximum depth of 5,000 (TVD), with obligatory coring of perspective intervals
Stage IV (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Glinnik (O) – documented in 1995; cumulative production to 2016 – 8.21 ktonnes; production in 2016 – 0.28 ktonnes; balance resources in 2016 – 7.38 ktonnes; industrial resources in 2016 – 4.76 ktonnes

Glinnik (G) – documented in 1995; cumulative production to 2016 – 0.82 million m³; production in 2016 – 0.05 million m³; balance resources in 2016 – 0.59 million m³; industrial resources in 2016 – 0.43 million m³

Stężycza (G) – documented in 1998; cumulative production to 2016 – 405.38 million m³; production in 2016 – 0.5 million m³; balance resources in 2016 – 401.82 million m³; industrial resources in 2016 – 105.36 million m³

Stężycza (O) – documented in 1998; cumulative production to 2016 – 1.9 ktonnes; production in 2016 – 0.2 ktonnes; balance resources in 2016 – 86.62 ktonnes; industrial resources in 2016 – 8.10 ktonnes

21 TENDER BLOCK SIERPOWO

Licensing rounds:
information and opportunities 2017-2018

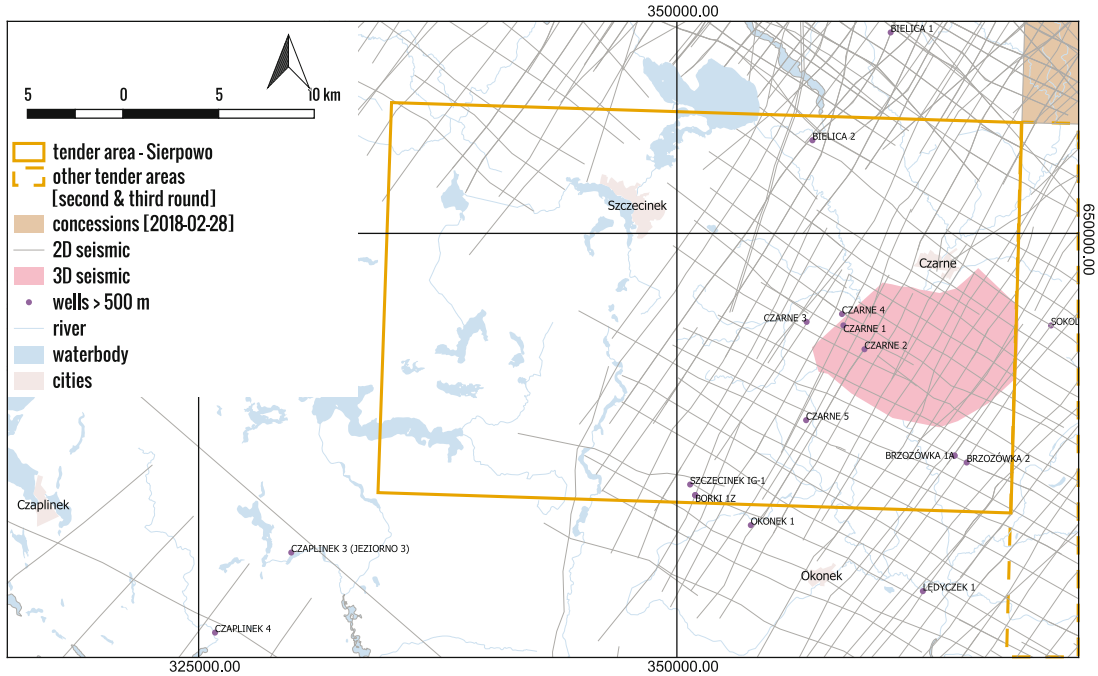


ACREAGE: 1047.73 km²
258,900 ACRES

The "Sierpowo" tender area is located between the edge of the East European platform and the Pomerania anticlinorium. A multi-level petroleum system occur here in the Devonian, Carboniferous, as well as Permian (Rotliegend and Zechstein Main Dolomite). The exploration potential in the Devonian is related to stratigraphic and structural traps developed in carbonate succession, in which hydrocarbons were generated from the Lower Devonian or Ordovician and Silurian source rocks. Numerous prospective structures for hydrocarbons are also found in the Rotliegend fluvial and aeolian sandstones. They have excellent porosity and permeability parameters, which have been recently confirmed by discovery of gas accumulation in the Czarne 1-5 wells. In the "Sierpowo" tender area, an isolated carbonate plat

form was found in the Zechstein Main Dolomite, in which carbonate barrier facies create great opportunity for exploration of hydrocarbons. Although, rather small oil and gas deposits are expected therein. The southern part of the "Sierpowo" area is less perspective, because of the occurrence of a shallow salt basin sediments. However, the Brzozówka oil-field was discovered in this part, as well.

Ten deep boreholes reached the perspective horizons in the "Sierpowo" tender area and another four boreholes drilled them out in the neighborhood. The 2D seismic investigations include 101 lines of total length of about 893 km. One 3D seismic survey of acreage of about 60 km² has been performed, so far.



21 TENDER BLOCK SIERPOWO

Licensing rounds:
information and opportunities 2017-2018

Location: onshore; part of Ministry of the Environment concession block: 106; in areas of the following counties and communes: Pomorskie province: Czluchów county, communes: Czarne (participation in the concession block: 17.26%), Rzeczenica (3.37%), Wielkopolskie province: Złotów county, commune: Okonek (12.77%), Zachodniopomorskie province: Szczecinek county, communes: Szczecinek (38.51%), Borne Sulinowo (20.45%), urban Szczecinek (7.24%), Grzmiąca (0.21%), Barwice (0.17%), Biały Bór (0.02%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years) extracting phase – after the investment decision

Type of deposit: Conventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – Devonian; II – Carboniferous-Permian/Rotliegend
III – Permian (Zechstein/Main Dolomite)

Reservoir rock:

I – Upper Devonian carbonates
II – Lower Carboniferous and Rotliegend sandstones
III – Main Dolomite carbonates

Thickness of overburden:

I > 3,800 m; II, III > 3,000 m

Completed seismic surveys (owner):

1988-1992: 30 lines Białogard-Czarne-Wilcze (State Treasury, PGNiG S.A.)

1976: 1 line Białogard-Czluchów (State Treasury)

1995: 2 lines Drzonowo-Wierzchowo (PGNiG S.A.)

1979: 1 line Piła-Bydgoszcz (State Treasury)

1976-1978, 1984-1985: 18 lines Szczecinek-Chojnice (State Treasury)

1985-1991: 48 lines Szczecinek-Złotów (State Treasury, PGNiG S.A.)

1979: 1 line Wysoka Kamieńska-Białogard (State Treasury)

2010: 60 km² Szczecinek 3D (State Treasury)

Structural stage:

Permian-Mesozoic; Devonian-Carboniferous

Source rock:

I – (hypothetic) Lower Palaeozoic and/or Devonian fine-grained clastics; II – Lower Carboniferous and Devonian fine-grained clastics; III – Main Dolomite organic-rich interbeds

Seal rock:

I – Carboniferous fine-grained clastic rocks and Zechstein evaporites

II, III – Zechstein evaporites

Trap type:

I – structural, lithological

II – structural, structural-stratigraphic, lithological

III – structural, lithological

Key wells (TVD):

Bielica 2 (4,102.0 m), Borki 1 (3,684.0), Borki 1Z (3,419.0 m), Borki 1Z-BIS (4,262.0 m), Brzozówka 1 (3,397.0 m), Brzozówka 1A (3,910.0 m), Brzozówka 2 (3,970.0 m), Czaplinek IG-1 (6,006.0 m), Czarne 1 (3,818.0 m), Czarne 2 (3,971.0 m), Czarne 3 (4,210.0 m), Czarne 4 (3,933.0 m), Czarne 5 (3,941.0 m), Szczecinek IG-1 (3,119.0 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analyses of the archival geological data

Stage II (12 months) – execution of 2D seismic survey (80 km) or execution of 3D seismic survey (50 km²)

Stage III (24 months) – drilling of one well to the minimum depth of 4,200 m and maximum depth of 6,000 (TVD), with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters

Stage IV (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Brzozówka (O+G) – documented in 1992; cumulative production to 2016 – 29.77 ktonnes; production in 2016 – none; balance resources in 2016 – none; industrial resources in 2016 – none;

Wierzchowo (G) – documented in 1972; cumulative production to 2016 – 514.02 million m³; production in 2016 – none; balance resources in 2016 – 10.78 million m³; industrial resources in 2016 – 10.69 million m³

22 TENDER BLOCK WEJHEROWO

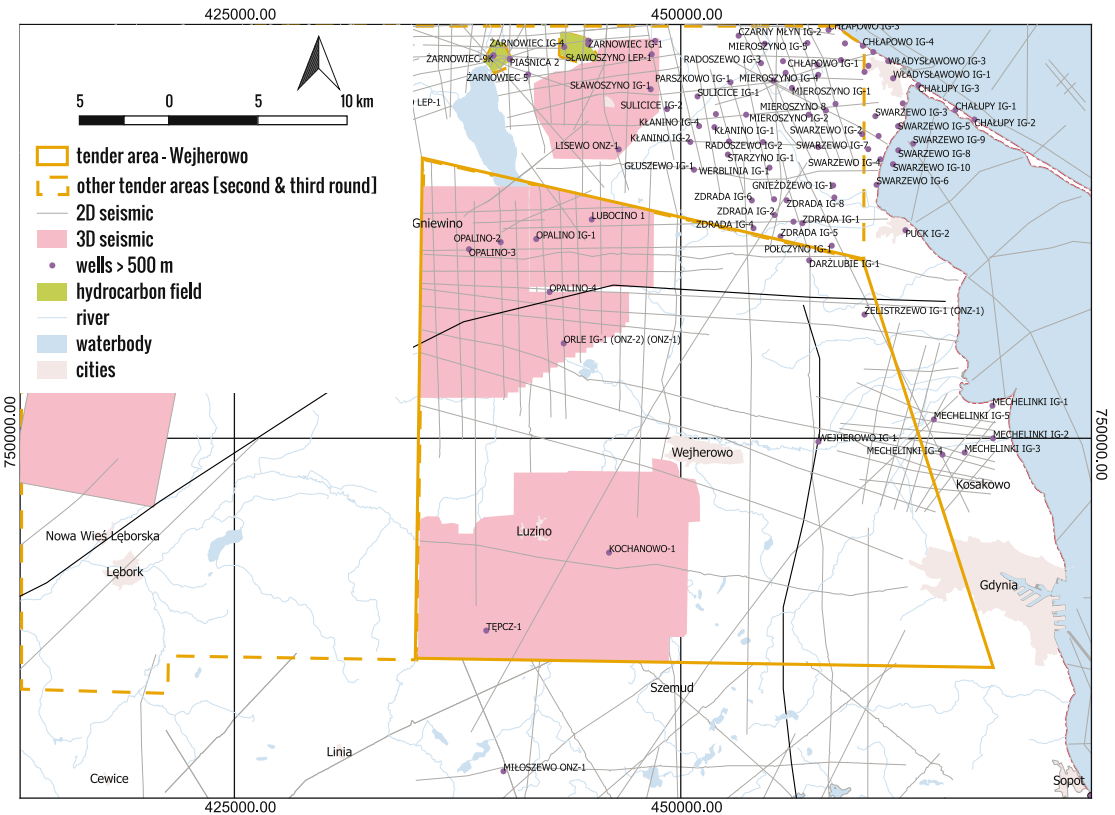
Licensing rounds:
information and opportunities 2017-2018



ACREAGE: 709.63 km²
175,353 ACRES


The “Wejherowo” tender area is dedicated to the exploration of both conventional and unconventional targets. It was considered as one of the most perspective areas for shale oil and gas exploration in the onshore part of the Baltic Basin. Shale oil and gas accumulations are supposed to occur within the Ordovician (Caradocian) and Silurian (Llandovery) strata, while conventional and tight oil or gas accumulations may be expected in the Middle Cambrian sandstones. Lubocino site, located within the tender area, was one of the first to report test production from the shale formations in Poland. Moreover, three conventional Cambrian oil fields were discovered in the close vicinity of the

Wejherowo area (Żarnowiec W, Dębki, Białogóra E) and one Cambrian tight gas accumulation was discovered within the area at the Opalino site. These accumulations are connected to the regional structural feature named Łeba High, which hosts oil and gas fields also in the offshore part of the Baltic Basin. Thirteen deep boreholes reached the perspective horizons in the “Wejherowo” tender area and another twenty-two in the neighborhood. The 2D seismic investigations include 50 lines of total length of about 698 km. Three 3D seismic surveys of total acreage of about 268 km² have been performed, so far.



22 TENDER BLOCK WEJHEROWO

Licensing rounds:
information and opportunities 2017-2018

 **Location:** onshore; part of Ministry of the Environment concession blocks: 29 areas of the following counties and communes: Pomorskie province: Gdynia urban county, commune: urban Gdynia (participation in the concession blocks: 5.57%), Puck county, communes: Puck (14.77%), Krokowa (2.92%), Kosakowo (1.45%), Wejherowo county, communes: Wejherowo (27.18%), Luzino (14.57%), Gniewino (11.84%), Łęczycze (5.15%), urban Reda (4.71%), Rumia (4.23%), Szemud (3.82%), urban Wejherowo (3.80%), Linia (<0.01%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (4.5 years) extracting phase – after the investment decision

Type of deposit: Conventional and unconventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – conventional and unconventional for tight oil and tight gas in the Middle Cambrian

II – unconventional for oil and gas from shale formations in the Lower Palaeozoic

Reservoir rock:

I – Middle Cambrian sandstones

II – Upper Cambrian (Piaśnica Fm.), Ordovician (Sasino Fm.) and Silurian (Jantar Mbr.) fine-grained clastics

Thickness of overburden: I, II – 2,500–3,000 m

Completed seismic surveys (owner):

1990: 5 lines Elektr. Jądrówka Żarnowiec 2D (State Treasury)

2003, 2007: 30 lines Kościerzyna-Gdańsk 2D (State Treasury)

2010: 13 lines Opalino-Lubocino 2D (State Treasury)

2012: 35 km² Lubocino 3D (State Treasury)

2013: 90 km² Opalino 3D (State Treasury)

2014: 144 km² Kochanowo-Tępcz-Cząstkowo 3D (State Treasury) 2 lines PolandSpan (ION)

Structural stage:

Caenozoic; Permian-Mesozoic; Lower Palaeozoic; Precambrian

Source rock:

I, II – Upper Cambrian (Piaśnica Fm.), Ordovician (Sasino Fm.) and Silurian (Jantar Mbr.) fine-grained clastics

Seal rock:

I, II – Lower Palaeozoic fine-grained clastic rocks and Zechstein evaporites

Trap type:

I – structural, stratigraphic, lithological

II – unconventional, continuous play

Key wells (TVD):

Darżlubie IG-1 (3,520.0 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (18 months) – interpretation and analyses of the archival geological data

Stage II (24 months) – drilling of one well to the maximum depth of 5,000 m (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters

Stage III (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Żarnowiec (O) – documented in 1977; cumulative production to 2016 – 7.88 ktonnes; production in 2016 – 0.11 ktonnes; balance resources in 2016 – 42.22 ktonnes; industrial resources in 2016 – 1.57 ktonnes

Żarnowiec-W (O) – documented in 1990; cumulative production to 2016 – 4.16 ktonnes; production in 2016 – 0.06 ktonnes; balance resources in 2016 – 17.75 ktonnes; industrial resources in 2016 – 3.78 ktonnes

Dębki (O) – documented in 1977; cumulative production to 2016 – 36.69 ktonnes; production in 2016 – 0.52 ktonnes; balance resources in 2016 – 8.10 ktonnes; industrial resources in 2016 – 8.13 ktonnes

Białogóra E (O) – documented in 1995; cumulative production to 2006 – 1.32 ktonnes; production in 2016 – none; balance resources in 2016 – none; industrial resources in 2016 – 0.38 ktonnes

23 TENDER BLOCK WETLINA

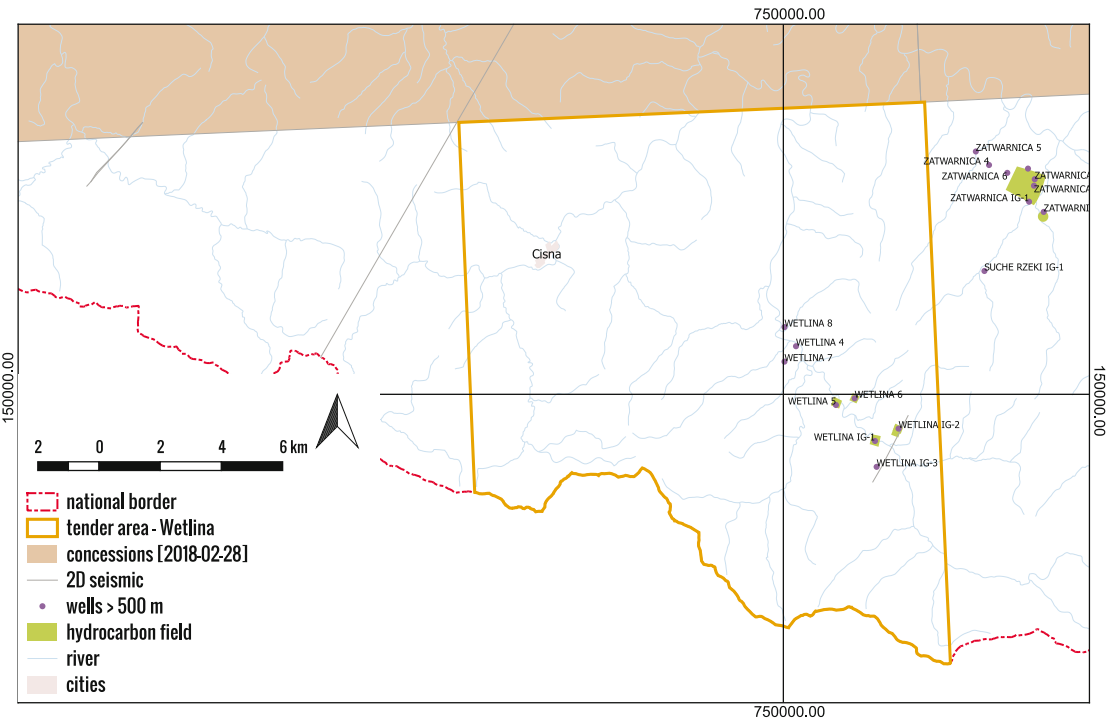
Licensing rounds:
information and opportunities 2017-2018



ACREAGE: 220.93 km²
54,593 ACRES


The hydrocarbon prospects in the “Wetlina” tender area are related to petroleum systems developed in Cretaceous – Paleogene flysch deposits of the Outer Carpathians. The system is expected as the oil- or gas-producing from the organic-rich flysch deposits belonging to three different units/nappes: Dukla, Fore-Dukla and Silesia. Two oil and gas deposits have been discovered in the neighborhood, so far. However, numerous hydrocarbon shows occur at the surface.

Eight deep boreholes reached the perspective horizons in the “Wetlina” tender area. The 2D seismic investigations include only one line of length 2.44 km. No 3D seismic surveys have been performed, so far.



23 TENDER BLOCK WETLINA

Licensing rounds:
information and opportunities 2017-2018

 **Location:** onshore; part of Ministry of the Environment concession block: 477; in areas of the following counties and communes: Podkarpackie province: Bieszczady county, communes: Lutowska (participation in the concession block: 4.10%), Czarna (2.77%), Lesko county, communes: Cisna (91.67%), Baligród (1.47%).

Concession type:

prospecting and exploration of hydrocarbon deposits and extracting hydrocarbons from deposits

Duration:

concession for 10 years, therein: prospecting and exploration phase (5 years) extracting phase – after the investment decision

Type of deposit: Conventional and unconventional for oil and gas

Participation:

winner of the tender (an entity or a consortium) 100%

Petroleum play:

I – conventional in the Carpathian flysch
II – unconventional in the Carpathian flysch

Reservoir rock:

I, II – Krosno and Menilite sandstone beds

Thickness of overburden: I, II – 250–1,800 m

Completed seismic surveys (owner):

1975: 1 line Bieszczady (State Treasury)

Structural stage:

Carpathian Flysch (Dukla Unit, Fore-Dukla Unit, Silesia Unit)

Source rock:

I, II – Menilite Beds, Cieszyn Beds, Wierzowice Beds, Spas Beds, Istebna Shale, unrecognized basement

Seal rock:

I, II – fine-grained deposits in the Dukla, Fore-Dukla and Silesia units

Trap type:

I – structural, structural-stratigraphic, lithological
II – unconventional tight type

Key wells (TVD):

Wetlina IG-1 (3,079.0 m), Wetlina IG-2 (3,300.0 m), Wetlina IG-3 (2,049.5 m), Wetlina 4 (1,940.0 m), Wetlina 5 (3,008.0 m), Wetlina 6 (2,100.0 m), Wetlina 7 (3,458.0 m), Wetlina 8 (2,503.0 m)

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analyses of the archival geological data
Stage II (12 months) – execution of 2D seismic survey (85 km)
Stage III (24 months) – drilling of one well to the minimum depth of 3,000 m and maximum depth of 6,000 (TVD) with obligatory coring of perspective intervals and full set of geophysical data allowing to interpret lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In the case of discovery – performance of production tests and determination of exploitation parameters
Stage IV (12 months) – analysis of the obtained data

The deposits identified in the vicinity [G – gas; O – oil]:

Wetlina (G) – documented in 1994; cumulative production to 2016 – none; production in 2016 – none; balance resources in 2016 – none; industrial resources in 2016 – none

Zatwarnica (O) – documented in 1974; cumulative production to 2016 – 9.42 ktonnes; production in 2016 – 0.11 ktonnes; balance resources in 2016 – 1.37 ktonnes; industrial resources in 2016 – 0.44 ktonnes

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